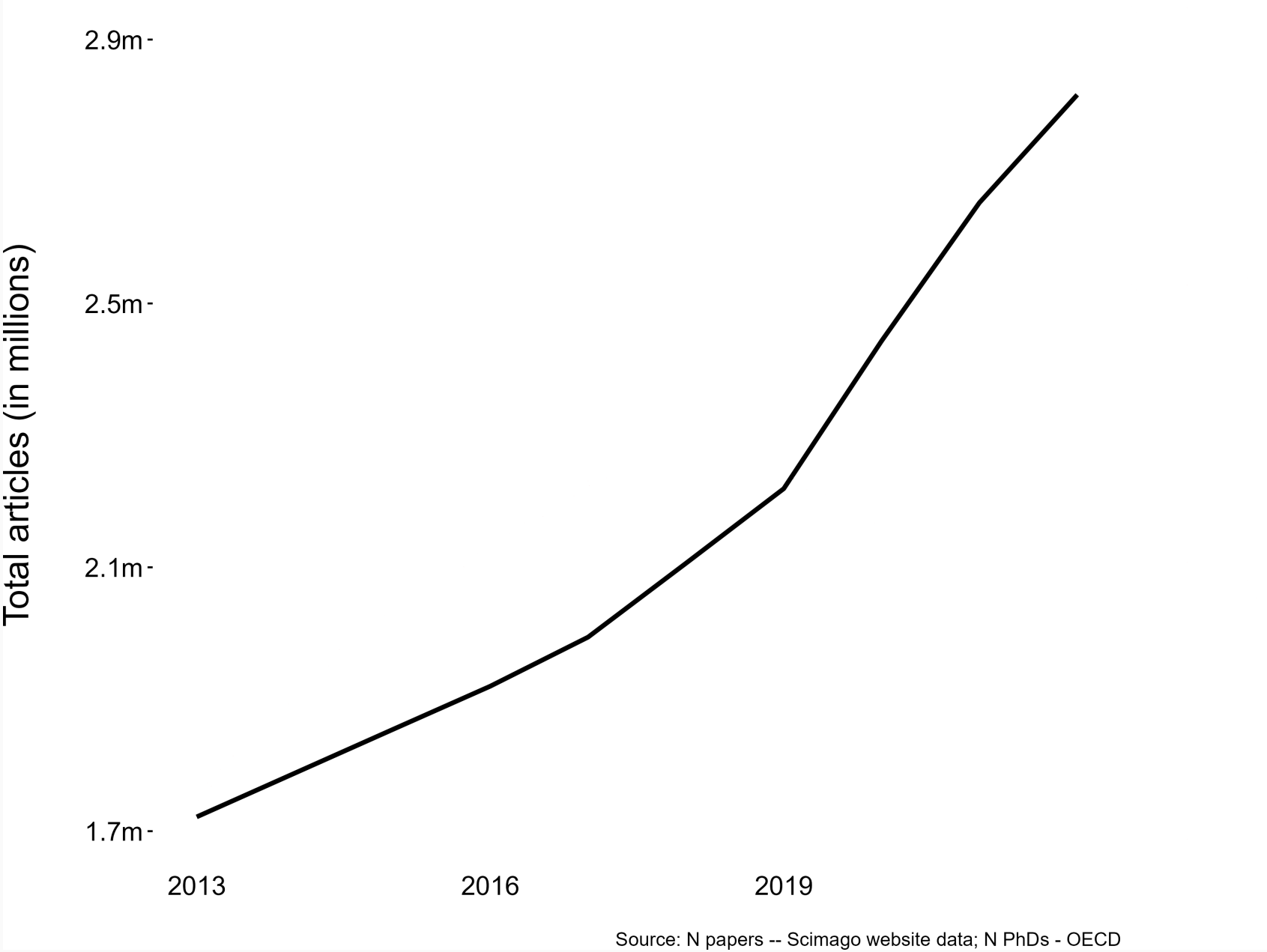
We’ve got issues

Understanding the current strain on scientific publishing

M. A. Hanson, P. Gómez Barreiro, **P. Crosetto**, D. Brockington

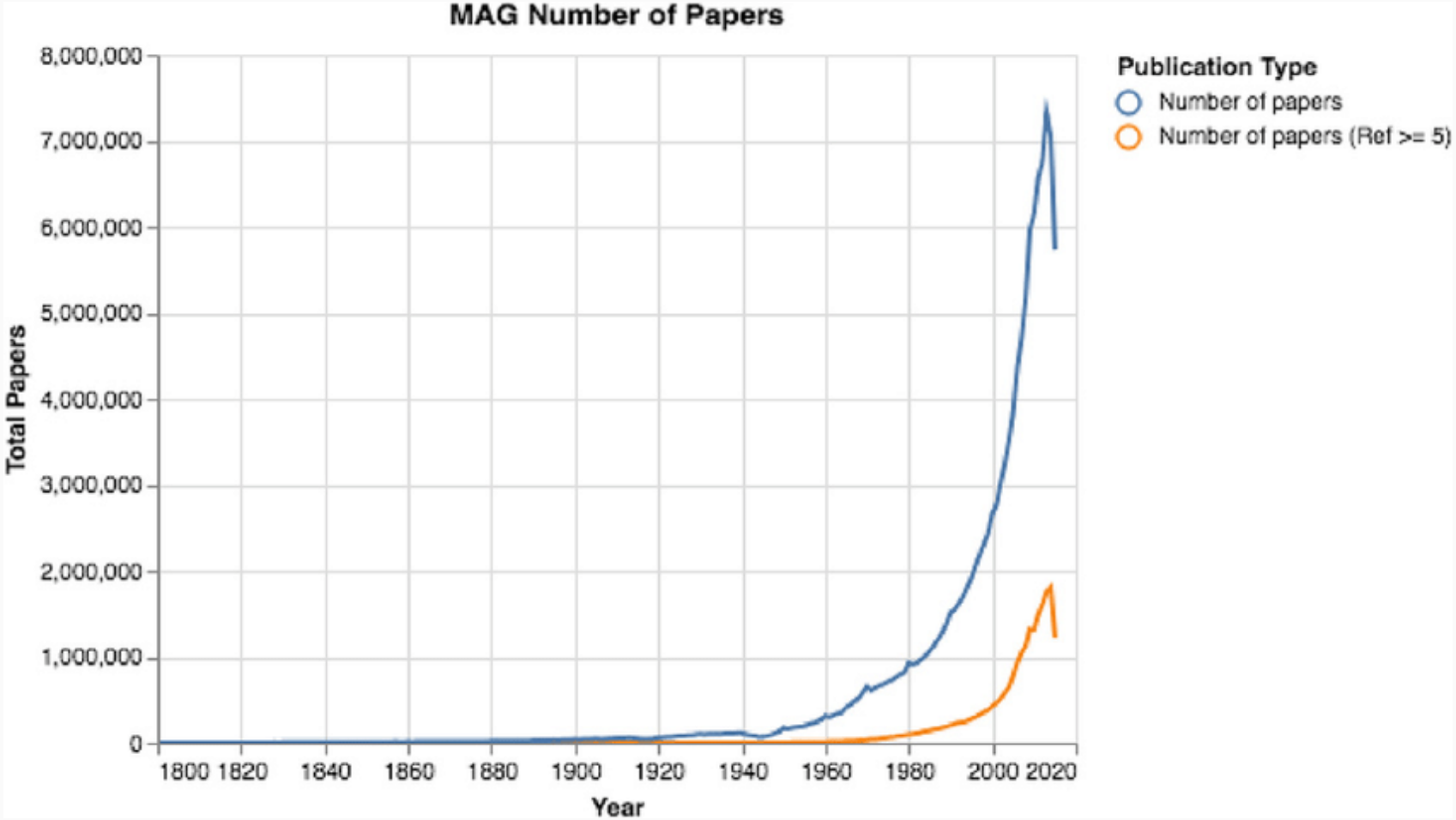
Basel – May 2nd, 2024

Academic publishing is undergoing an exponential growth



Source: N papers -- Scimago website data; N PhDs - OECD

This is not news



Source: Fire & Guestrin 2019

...and people have been complaining about it for a long time

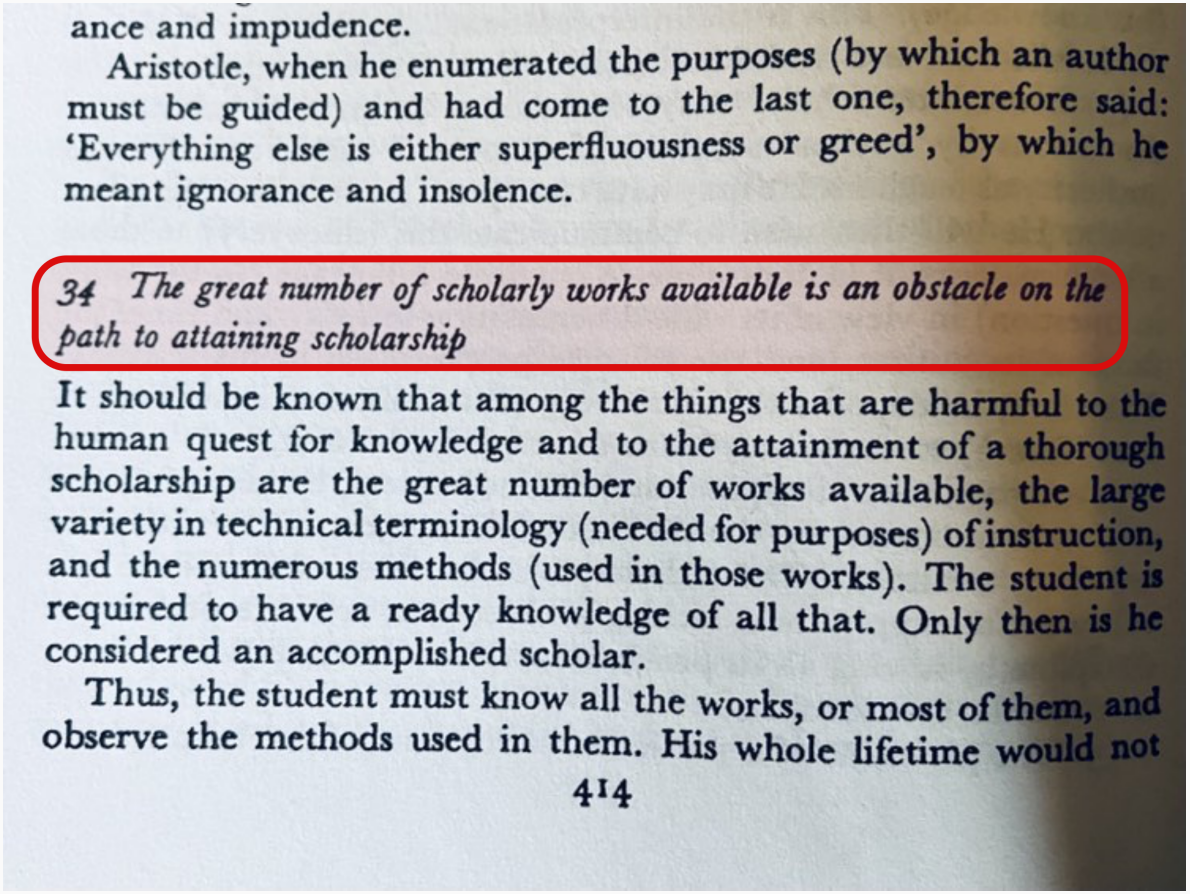
In 1958, when James D. Watson worked his way up to the rank of associate professor at Harvard, the young biochemist had on his curriculum vitae 18 papers. One of them, published 5 years earlier, described the structure of deoxyribonucleic acid.

Today, the bibliography of a candidate facing a similar climb often lists 50 or even 100 papers.

As the comparison suggests, paper inflation has become a fact of academic life during the past two decades. This is

Science, March 1981

a LONG time



ance and impudence.

Aristotle, when he enumerated the purposes (by which an author must be guided) and had come to the last one, therefore said: 'Everything else is either superfluousness or greed', by which he meant ignorance and insolence.

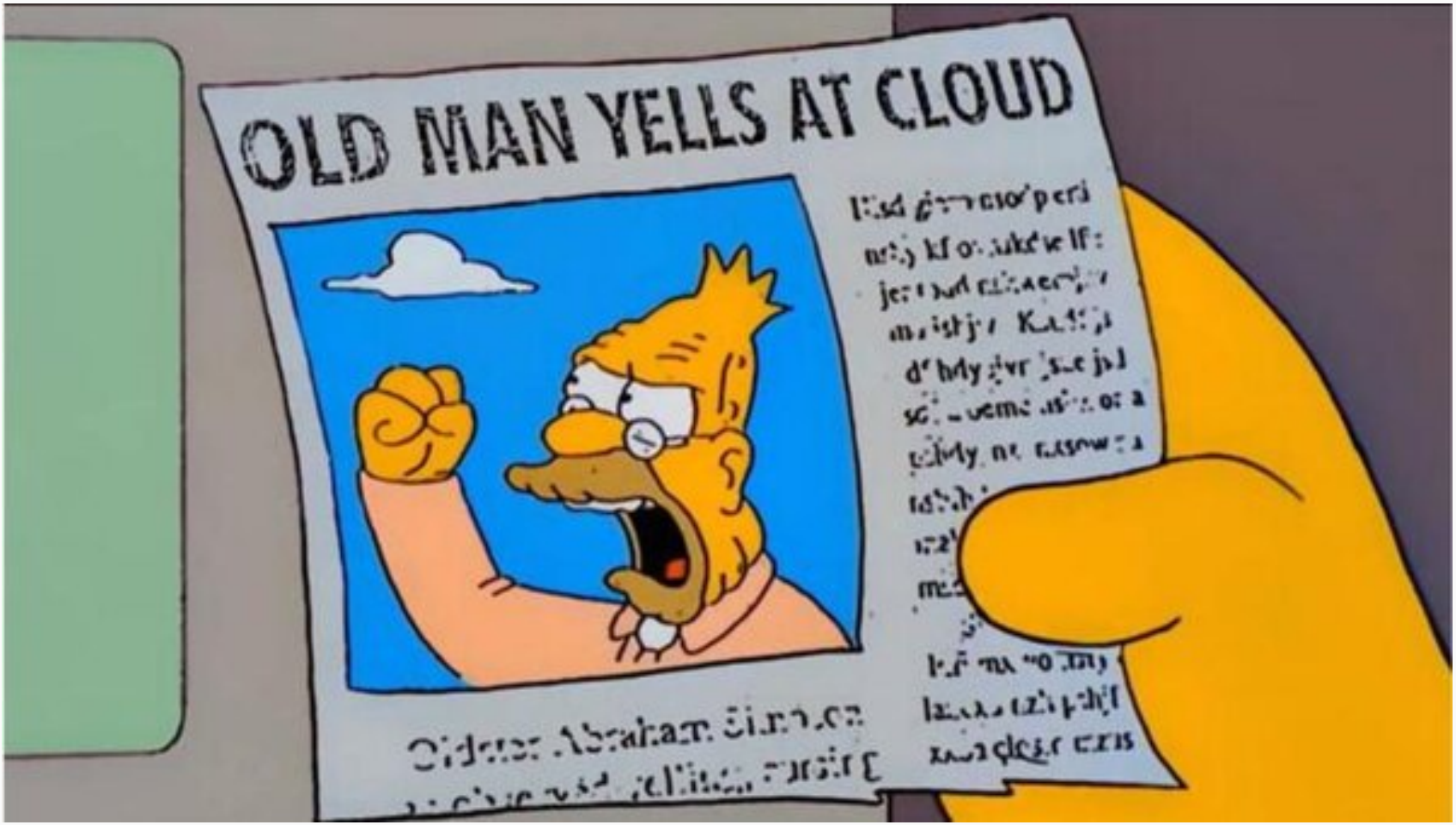
34 The great number of scholarly works available is an obstacle on the path to attaining scholarship

It should be known that among the things that are harmful to the human quest for knowledge and to the attainment of a thorough scholarship are the great number of works available, the large variety in technical terminology (needed for purposes) of instruction, and the numerous methods (used in those works). The student is required to have a ready knowledge of all that. Only then is he considered an accomplished scholar.

Thus, the student must know all the works, or most of them, and observe the methods used in them. His whole lifetime would not

414

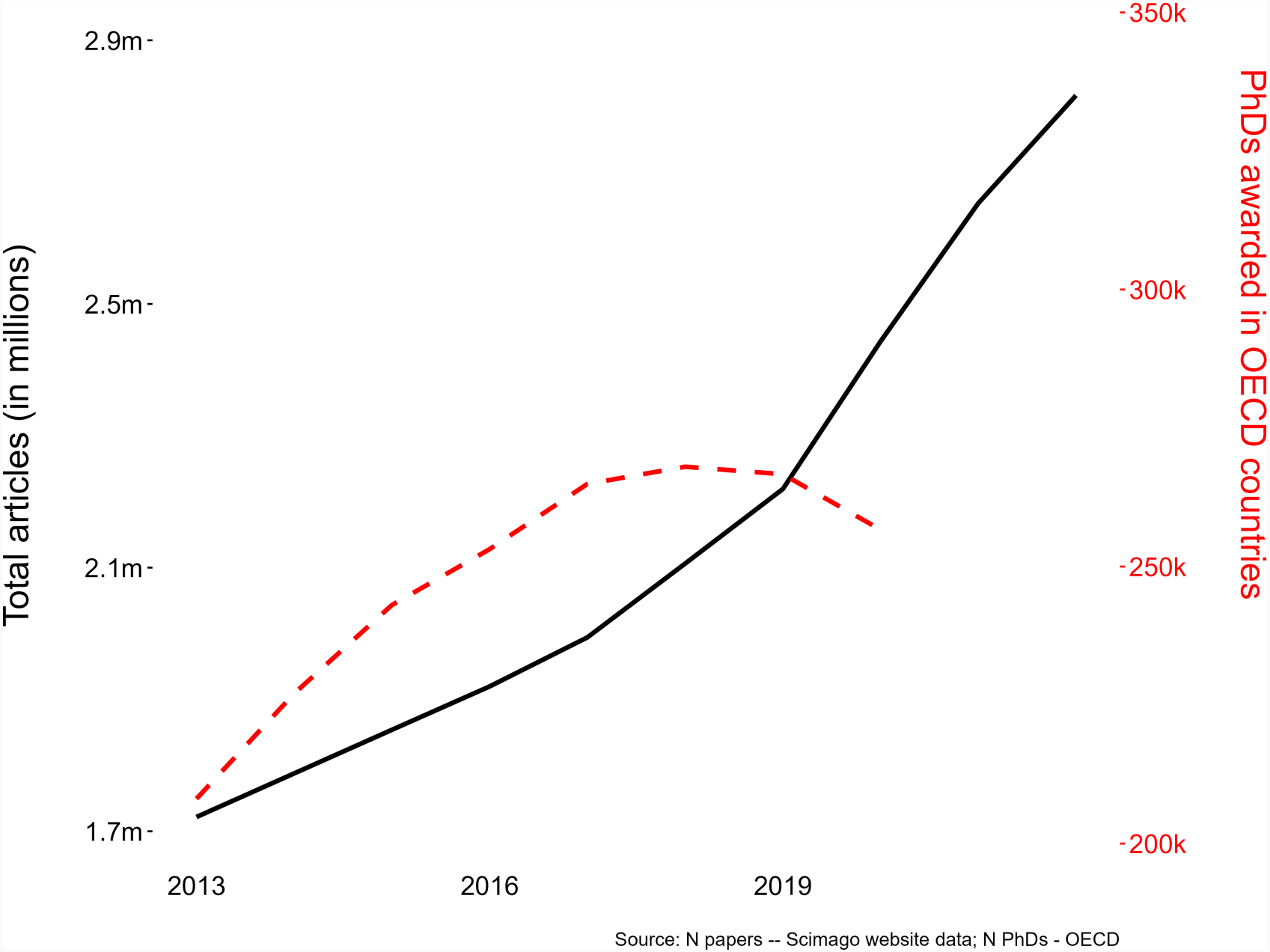
Ibn Khaldun, 1332-1406


OLD MAN YELLS AT CLOUD

This is mostly a good thing

- More scientists around
- More funds for research
- Open Access: more results available to anyone
- Web tools: faster dissemination of ideas
- Lower file drawer effects
- More replications, robustness, reviews, meta-analyses

But the number of scientists has hit a limit

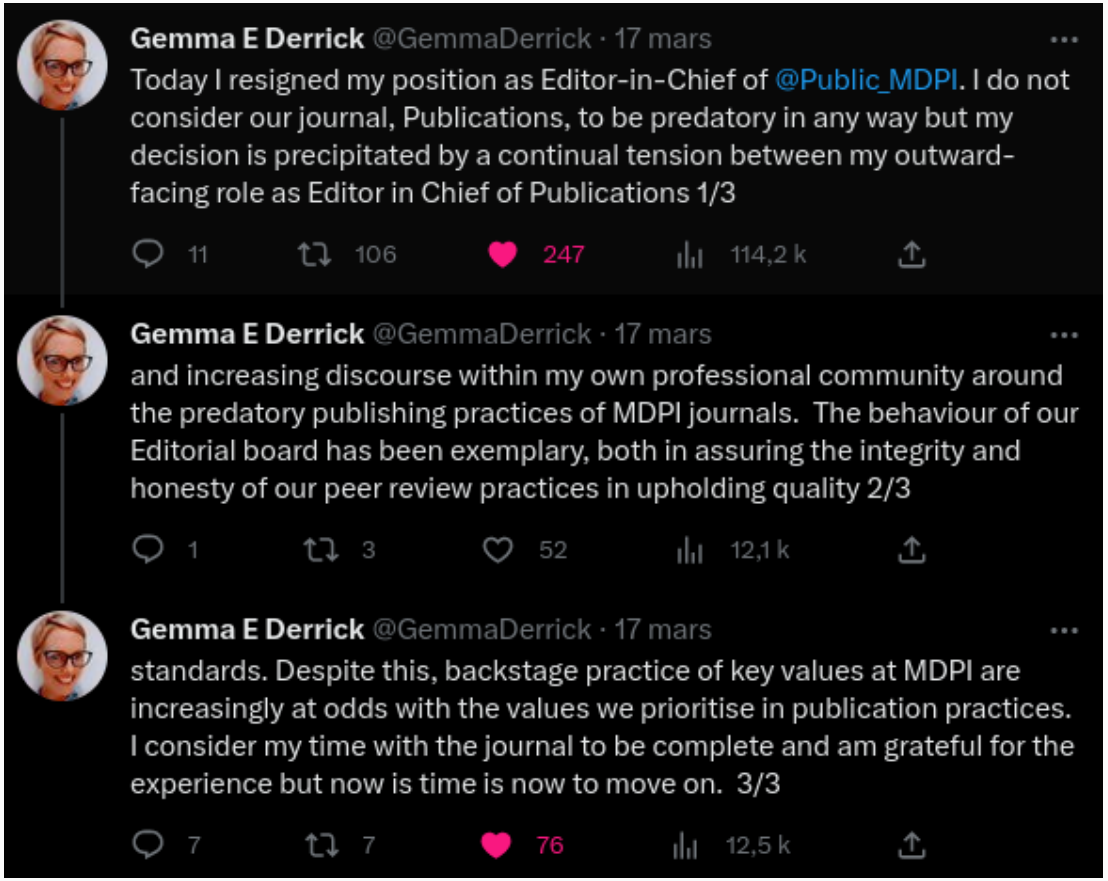


Source: N papers -- Scimago website data; N PhDs - OECD

...and we've got issues

Editors resigning over high fees

...and we've got issues



Gemma E Derrick @GemmaDerrick · 17 mars

Today I resigned my position as Editor-in-Chief of @Public_MDPI. I do not consider our journal, Publications, to be predatory in any way but my decision is precipitated by a continual tension between my outward-facing role as Editor in Chief of Publications 1/3

11 106 247 114,2 k

Gemma E Derrick @GemmaDerrick · 17 mars

and increasing discourse within my own professional community around the predatory publishing practices of MDPI journals. The behaviour of our Editorial board has been exemplary, both in assuring the integrity and honesty of our peer review practices in upholding quality 2/3

1 3 52 12,1 k

Gemma E Derrick @GemmaDerrick · 17 mars

standards. Despite this, backstage practice of key values at MDPI are increasingly at odds with the values we prioritise in publication practices. I consider my time with the journal to be complete and am grateful for the experience but now is time is now to move on. 3/3

7 7 76 12,5 k

Editors resigning
over bad publisher practices

...and we've got issues

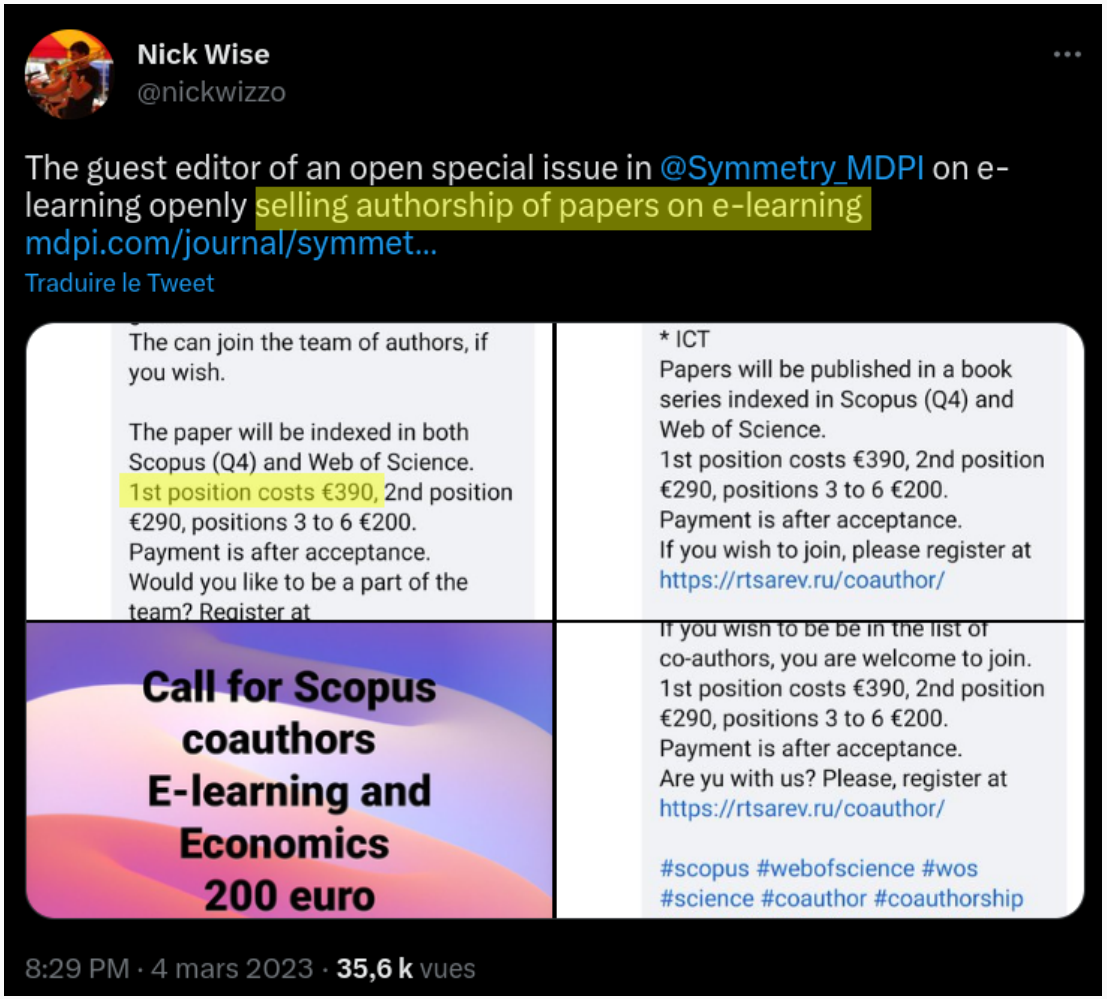
Paper mills
mass producing
fake articles

NEWS FEATURE | 23 March 2021

The fight against fake-paper factories that churn out sham science

Some publishers say they are battling industrialized cheating. A *Nature* analysis examines the 'paper mill' problem – and how editors are trying to cope.

...and we've got issues



Authorship sales rings

...and we've got issues

Stunningly prolific authors

EL PAÍS

ce & Tech

SILICON VALLEY · YOUTUBE ·

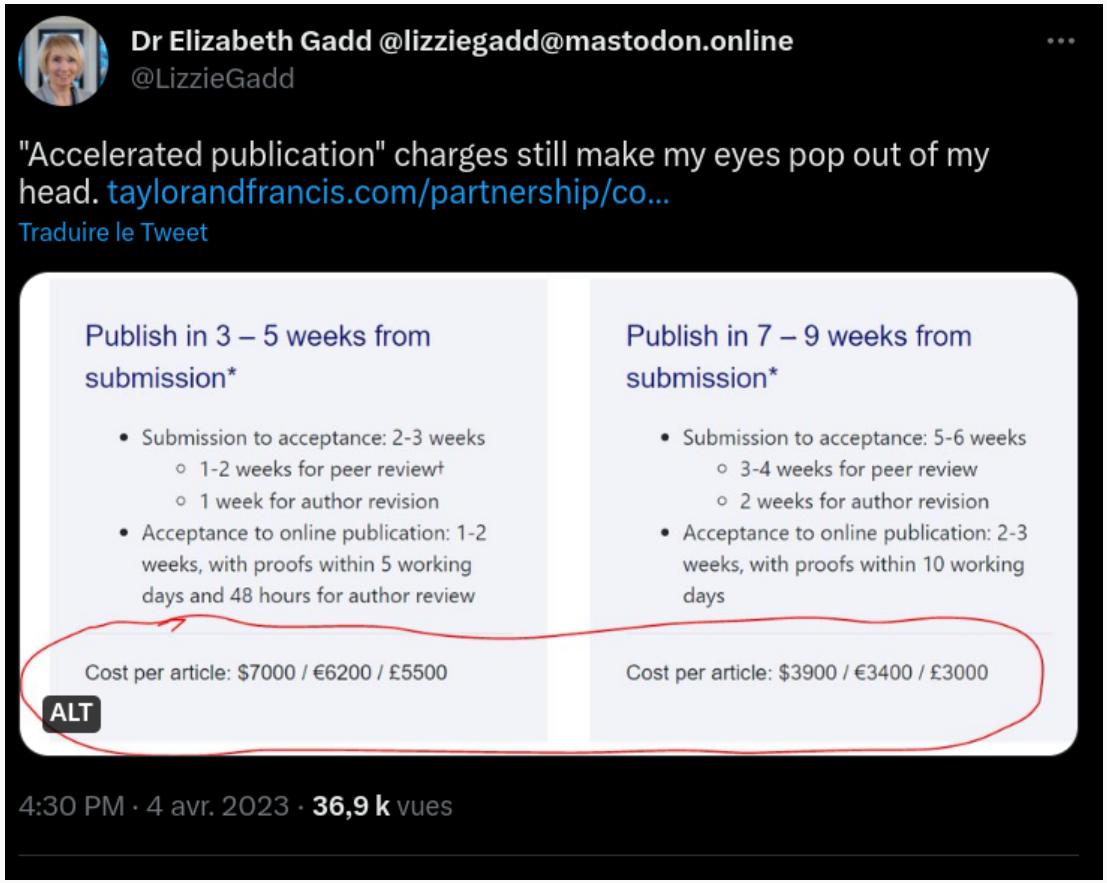
SCIENTIFIC ETHICS >

One of the world's most cited scientists, Rafael Luque, suspended without pay for 13 years

The prolific chemist, who has published a study every 37 hours this year, has been sanctioned by the University of Córdoba over his research work for other institutions in Russia and Saudi Arabia

...and we've got issues

Pay to get faster through peer-review



...and we've got issues

PHR Public Health Reviews

CiteScore 9.6 How to publish Submit

EDITORIAL

Public Health Rev, 17 November 2022
https://doi.org/10.3389/phrs.2022.1605407

Check for updates

«I Do Not Have Time»—Is This the End of Peer Review in Public Health Sciences?

Nino Künzli[1,2,3*], Anke Berger[1,3], Katarzyna Czabanowska[4], Raquel Lucas[5], Andrea Madarasova Geckova[6], Sarah Mantwill[7] and Olaf von dem Knesebeck[8]

Editors unable to find referees

...and we've got issues

SCIENCEINSIDER | SCIENTIFIC COMMUNITY

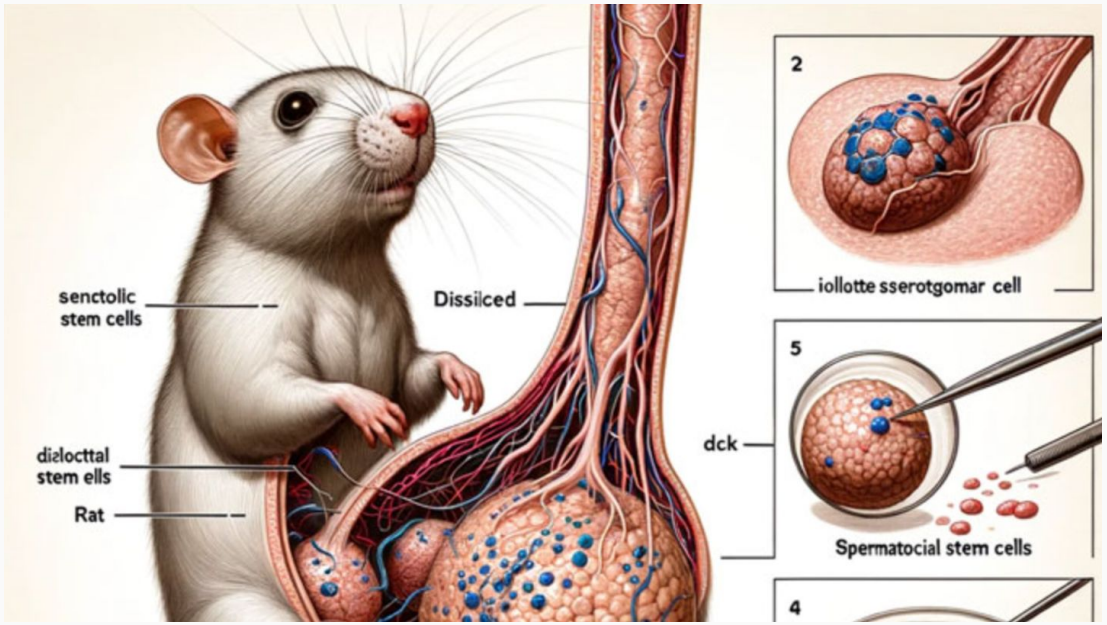
Fast-growing open-access journals stripped of coveted impact factors

Web of Science delists some 50 journals, including one of the world's largest

28 MAR 2023 · 5:55 PM · BY JEFFREY BRAINARD

Mega-journals being delisted from WoS

...and we've got issues



All this before
the 2023 AI explosion

How does publishing work?

A *caveat*: no need for "predatory" labels

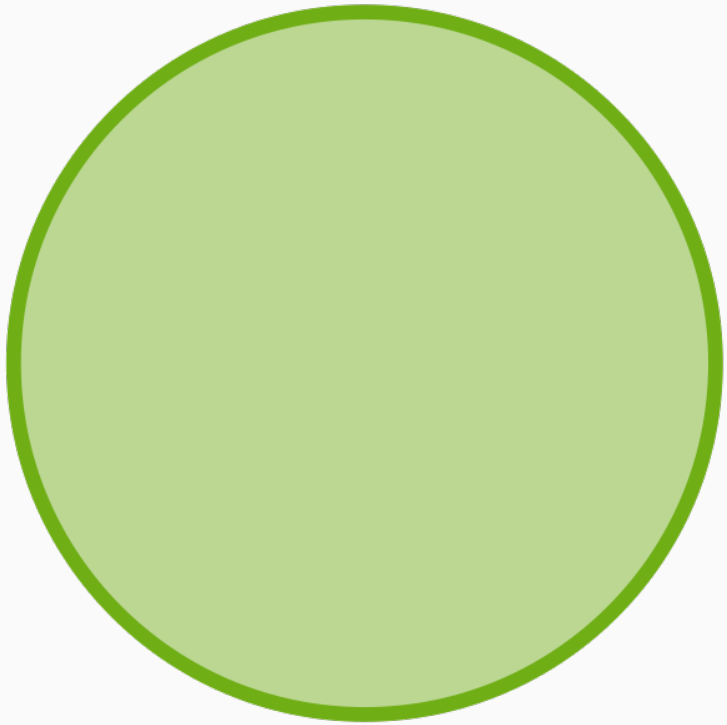
We don’t think binary labels improve our understanding

There’ll be no "predatory" judgments here

- outright fraudsters do exist (publishers *and* authors)
- agents just follow their interest
- market rules generate outcomes
- outcomes can be good or bad
  - for the different actors
  - for the public good that is science

Behold the scientific publishing system

Publishers



Researchers

Funders

What does the system do?

What are the functions the system fulfills...

for Scientists

- dissemination
- reputation
- sorting

for Publishers

- profits
- dissemination
- sustainability

for Funders

- selection
- prioritization
- public access

What do the different actors want?

What do different actors want from the system?

Scientists

- high reputation
- low effort
- stability

Publishers

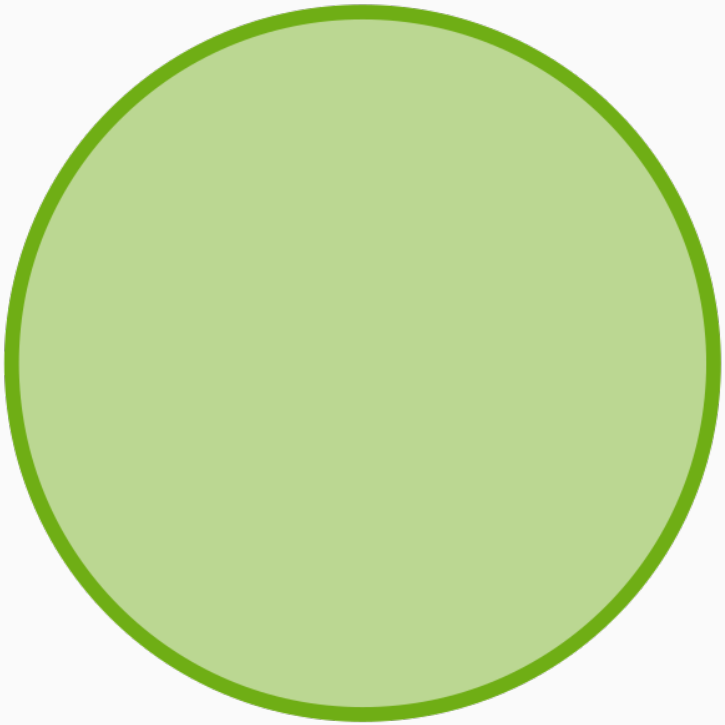
- high reputation
- high quantity
- high revenue

Funders

- stability
- true signal
- low spending

The system, growing under strain

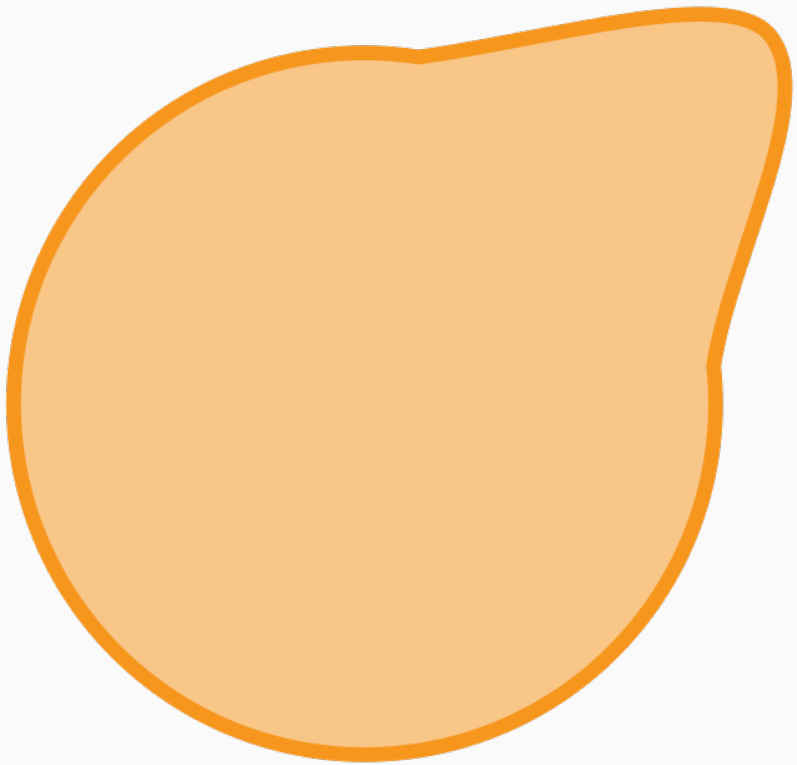
Publishers



Researchers

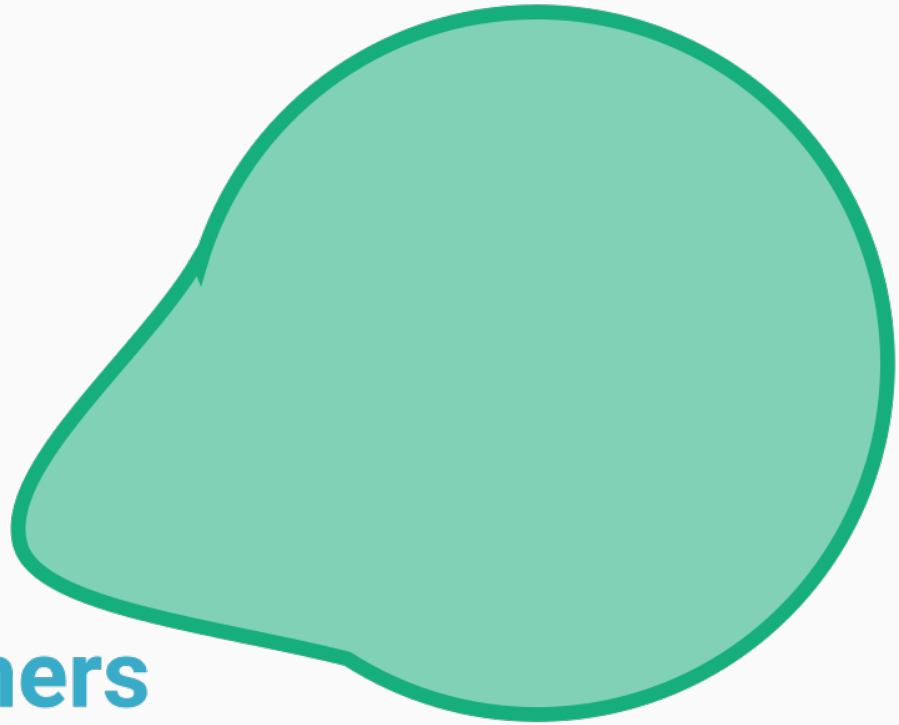
Funders

The system, growing under strain



The system, growing under strain

Publishers

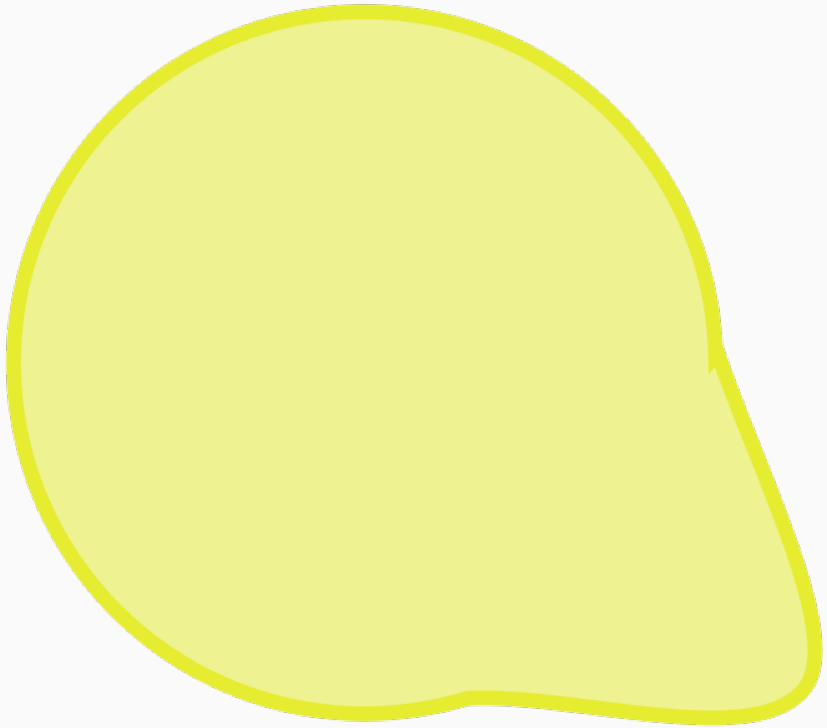


Researchers

Funders

The system, growing under strain

Publishers



Researchers

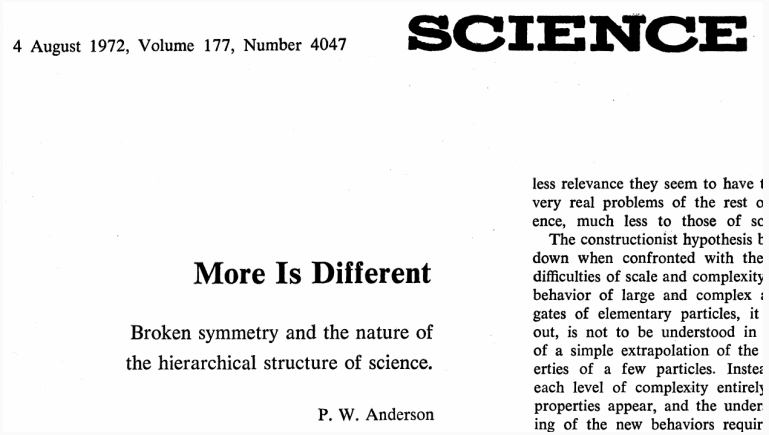
Funders

What is going on?

More is different

Growth is not more of the same:
growth means change.

- new practices
- new business strategies
- new incentives
- new constraints
- new meanings



4 August 1972, Volume 177, Number 4047 **SCIENCE**

More Is Different

Broken symmetry and the nature of the hierarchical structure of science.

P. W. Anderson

less relevance they seem to have t
very real problems of the rest o
ence, much less to those of sc
The constructionist hypothesis b
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difficulties of scale and complexity
behavior of large and complex
gates of elementary particles, it
out, is not to be understood in
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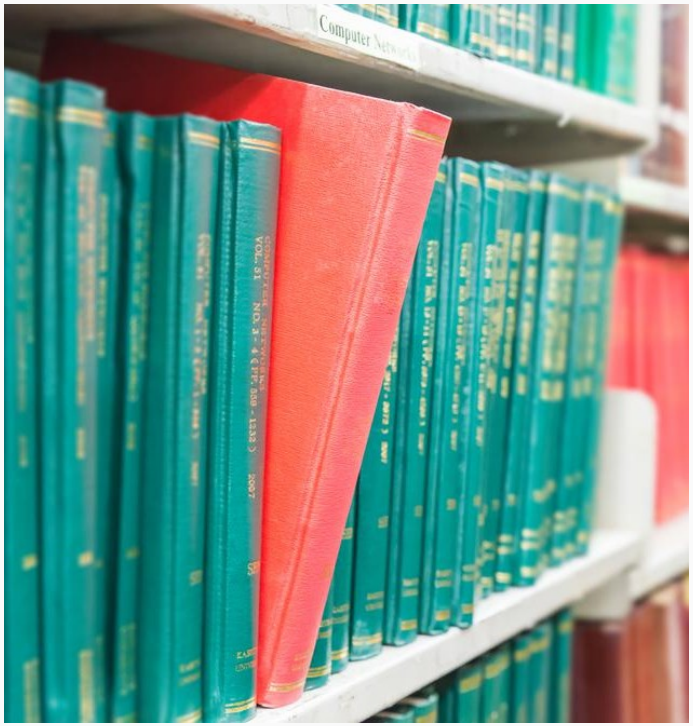
each level of complexity entirely
properties appear, and the under
ing of the new behaviors requir

A semantic shift

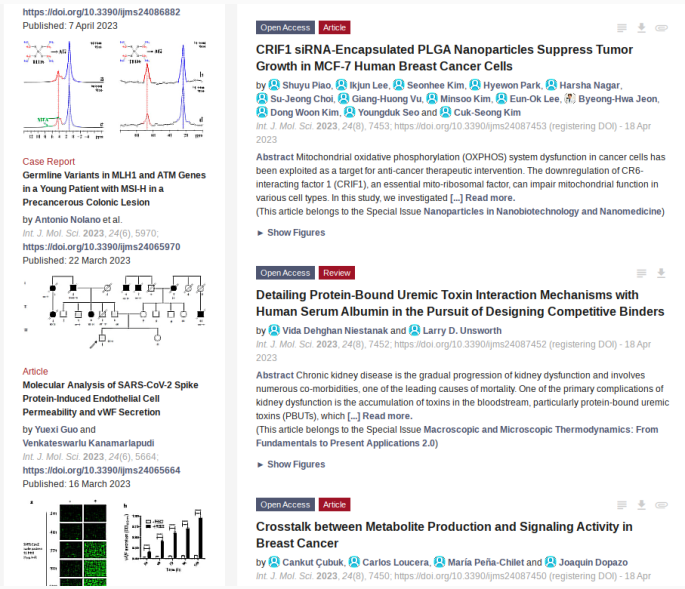
"Journal"

used to mean



A physical object with limited available space

now it also means



A limitless electronic repository with a name

A semantic shift

"**Publication**"

used to mean

- a handful of journals
- long delays
- low acceptance rates
- free for authors
- do it and thrive

⇒ *good science rejected?*

now it also means

- thousands of journals
- short delays
- high acceptance rates
- authors pay
- don’t do it and die

⇒ *bad science accepted?*

A semantic shift

"**Special issue**"

used to mean

- A once-in-a-while issue
- About a special topic
- Strict editor control
- regular > special

now it also means

- A many-a-day issue
- About any topic
- Relaxed editor control
- special > regular

A semantic shift

"**Publisher business model**"

used to mean

- Many small journals
- Readers pay
- $ through subscription
- "*Polish your gems*"

Incentive to ↑↑ quality, quantity? . . .

now it also means

- Few mega-journals
- Authors pay
- $ through publication
- "*Get authors on board*"

Incentive to ↑↑ quantity, quality? . . .

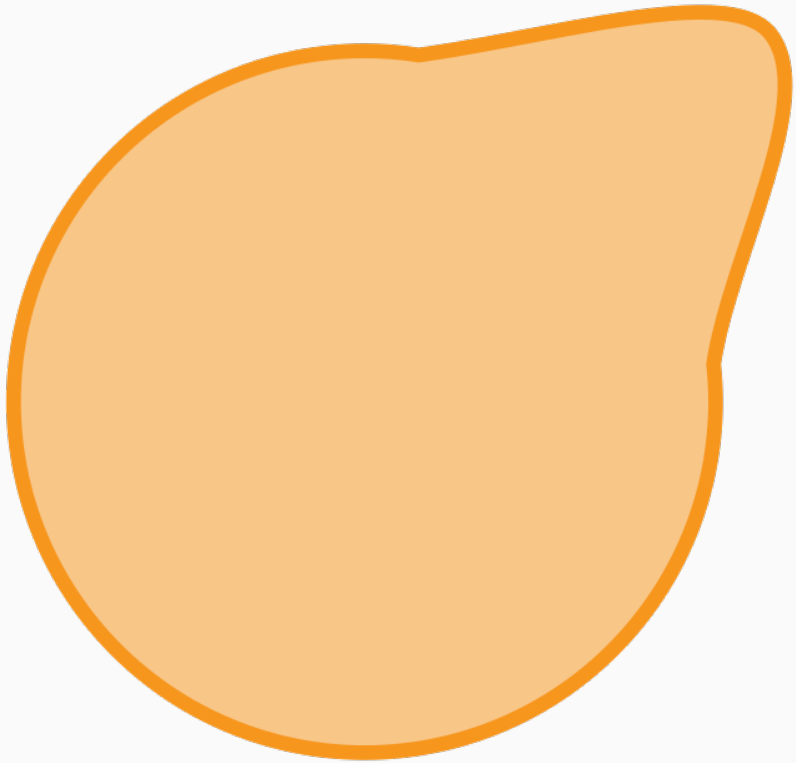
Our analysis:

Understanding the strain put on the system

by evolving publishers practices

So, this

Publishers

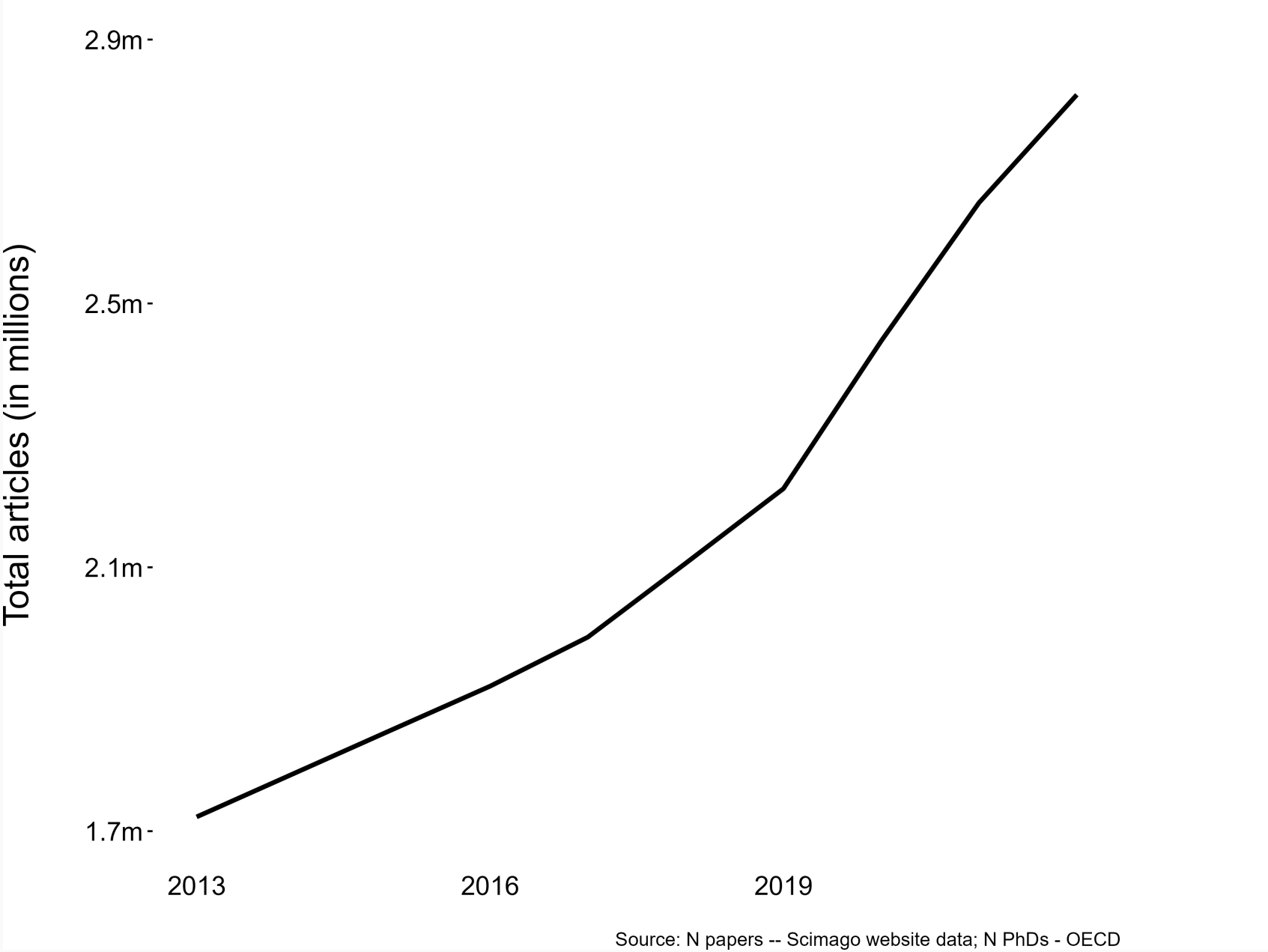


Researchers

Funders

Wanna know more? get our preprint

Which trends and threats hide behind this exceptional growth?



Source: N papers -- Scimago website data; N PhDs - OECD

Analysis plan

We single out five indicators of strain on the system:

- Number and size of journals
- Number and role of Special Issues
- Turnaround times
- Rejection rates
- Impact Factor inflation

None of them is critical *per se*

together they indicate strain imposed by publishers

Data sources

We exploit data coming from various sources:

- A full scrape of the Scimago Journal Rankings database

  used for: comparisons across publishers, IF, SJR rank...

- OECD and US NSF data

  used for: number of PhDs awarded per year

- Web scrape of MDPI, Frontiers, Hindawi, PLoS

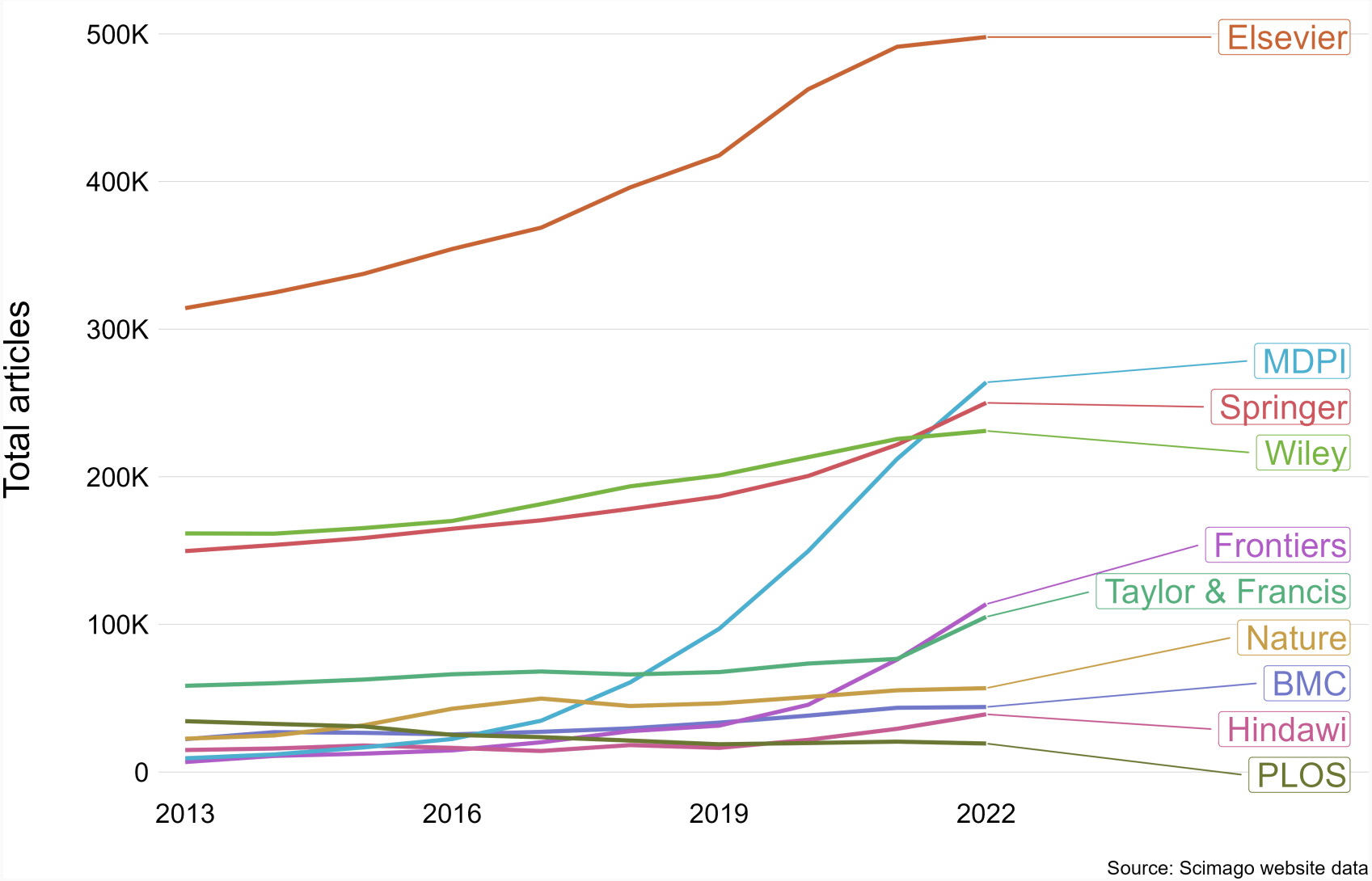
  used for: turnaround times, special issues

- First hand data from publisher reports and websites

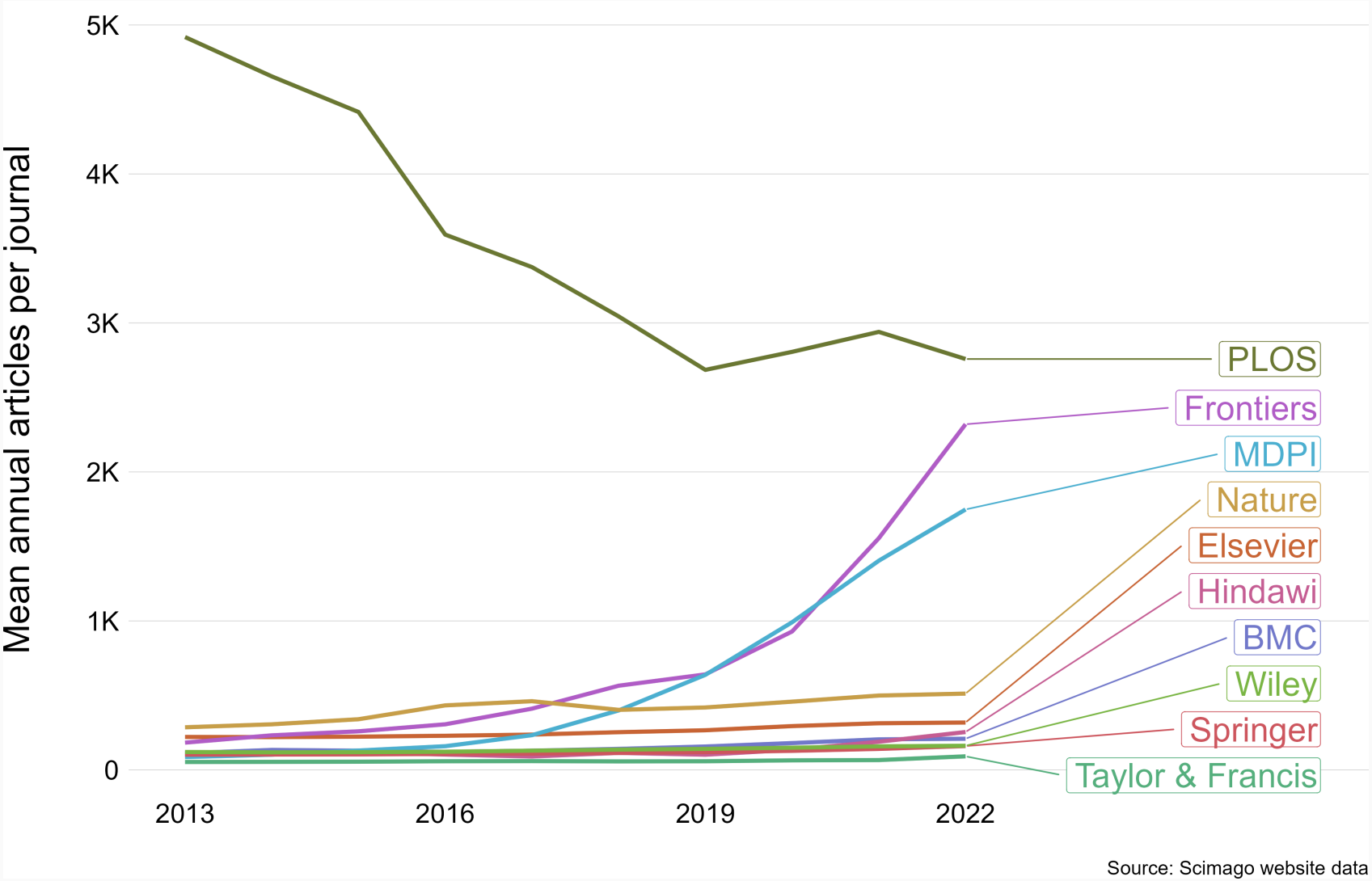
  used for: rejection rates

Number of articles & journal size

The rise of new publishers

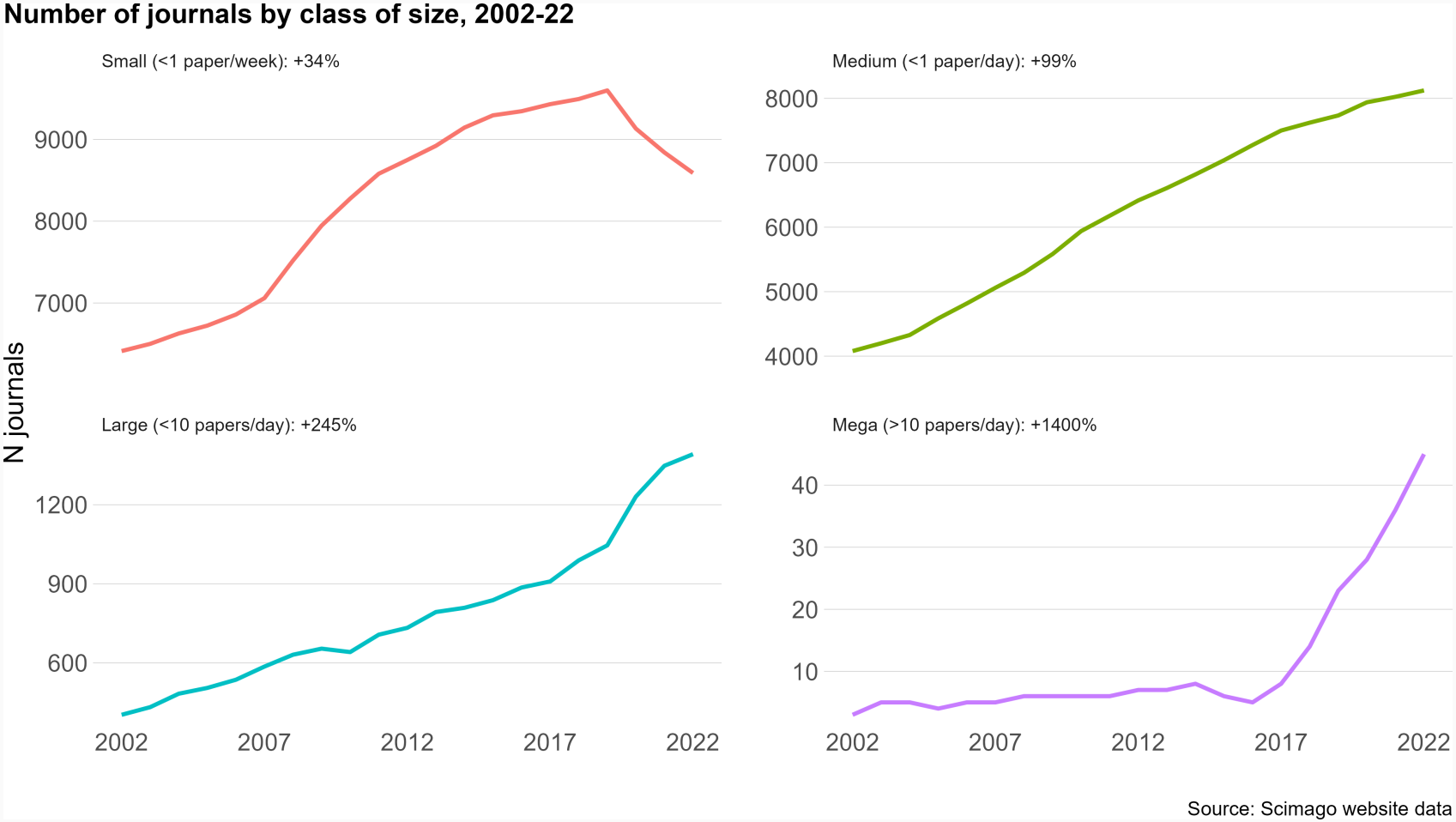


Bigger journals



Source: Scimago website data

The rise of mega-journals



Source: Scimago website data

What's going on?

Trends:

- Growth means concentration, especially for new players

Why?

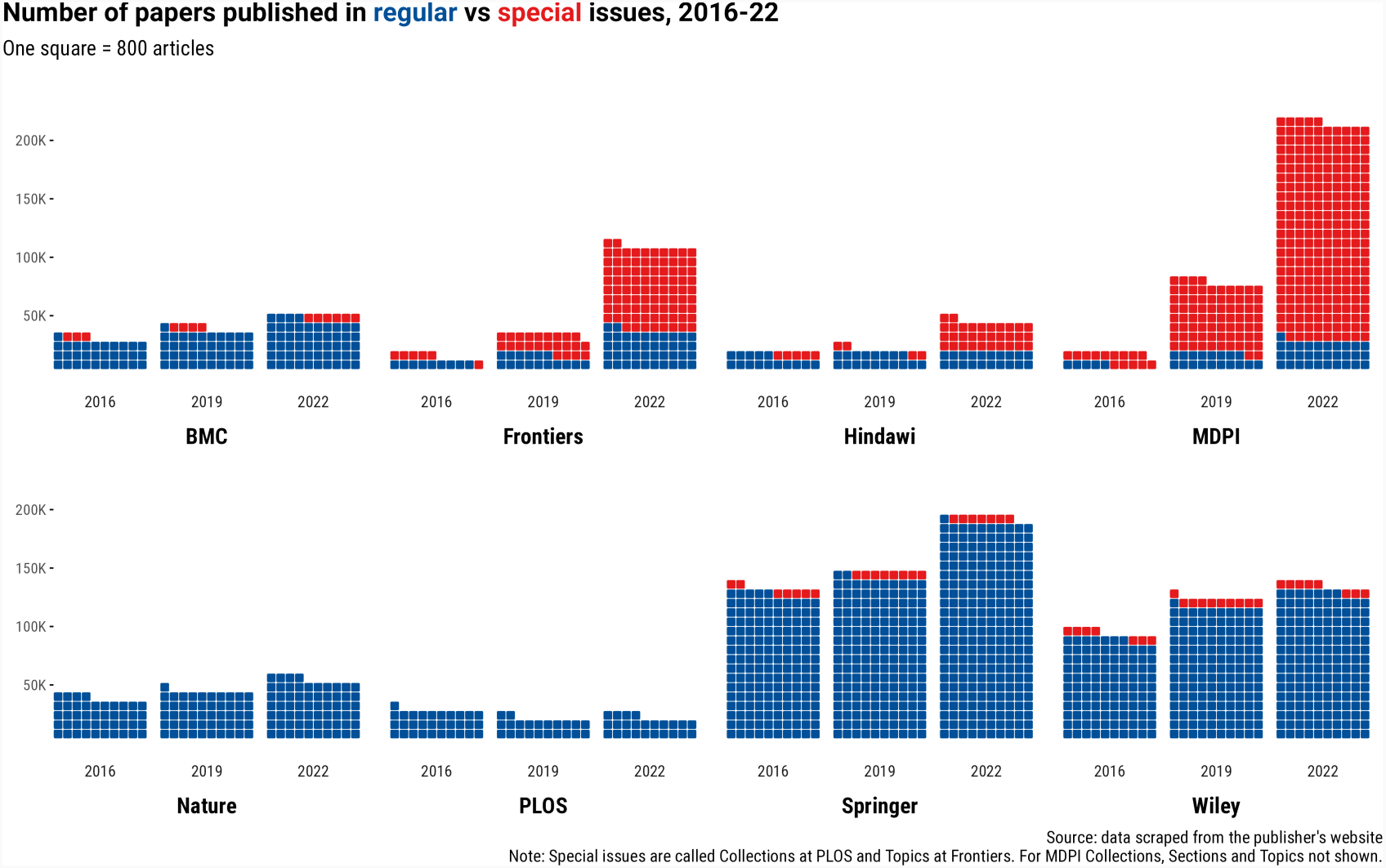
- Scientists tend to flock to journals with high reputation
- Hard to set up, but if you have one, exploit it

Threats

- How much can a journal inflate before it loses reputation?
- Risk of instability of quality signals

The role of special issues

Not so special after all



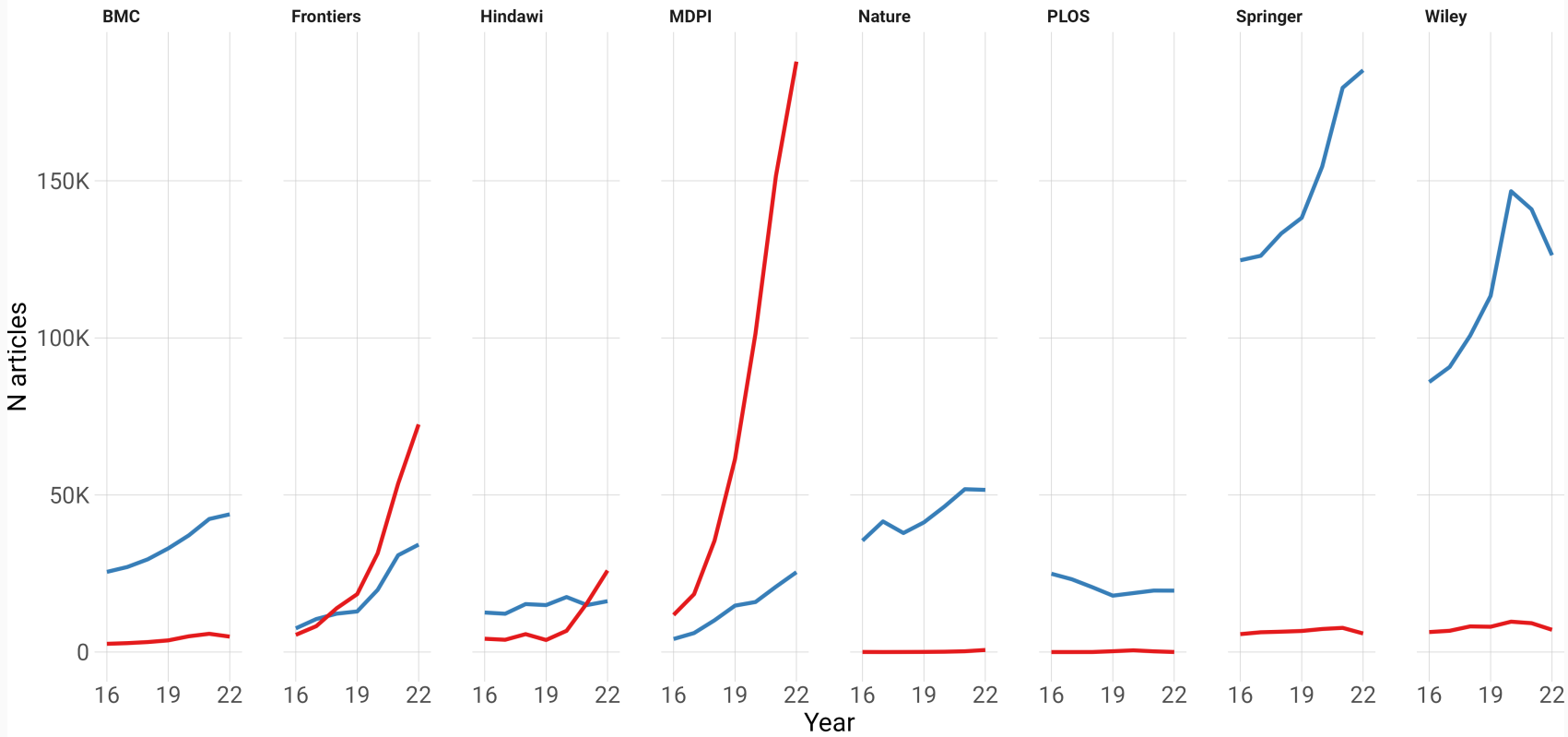
Source: data scraped from the publisher's website

Note: Special issues are called Collections at PLOS and Topics at Frontiers. For MDPI Collections, Sections and Topics not shown.

Not so special after all

Number of papers published in regular vs special issues, 2016-22

Wiley decrease in 2022 likely due to limited coverage of WIley papers in 2022



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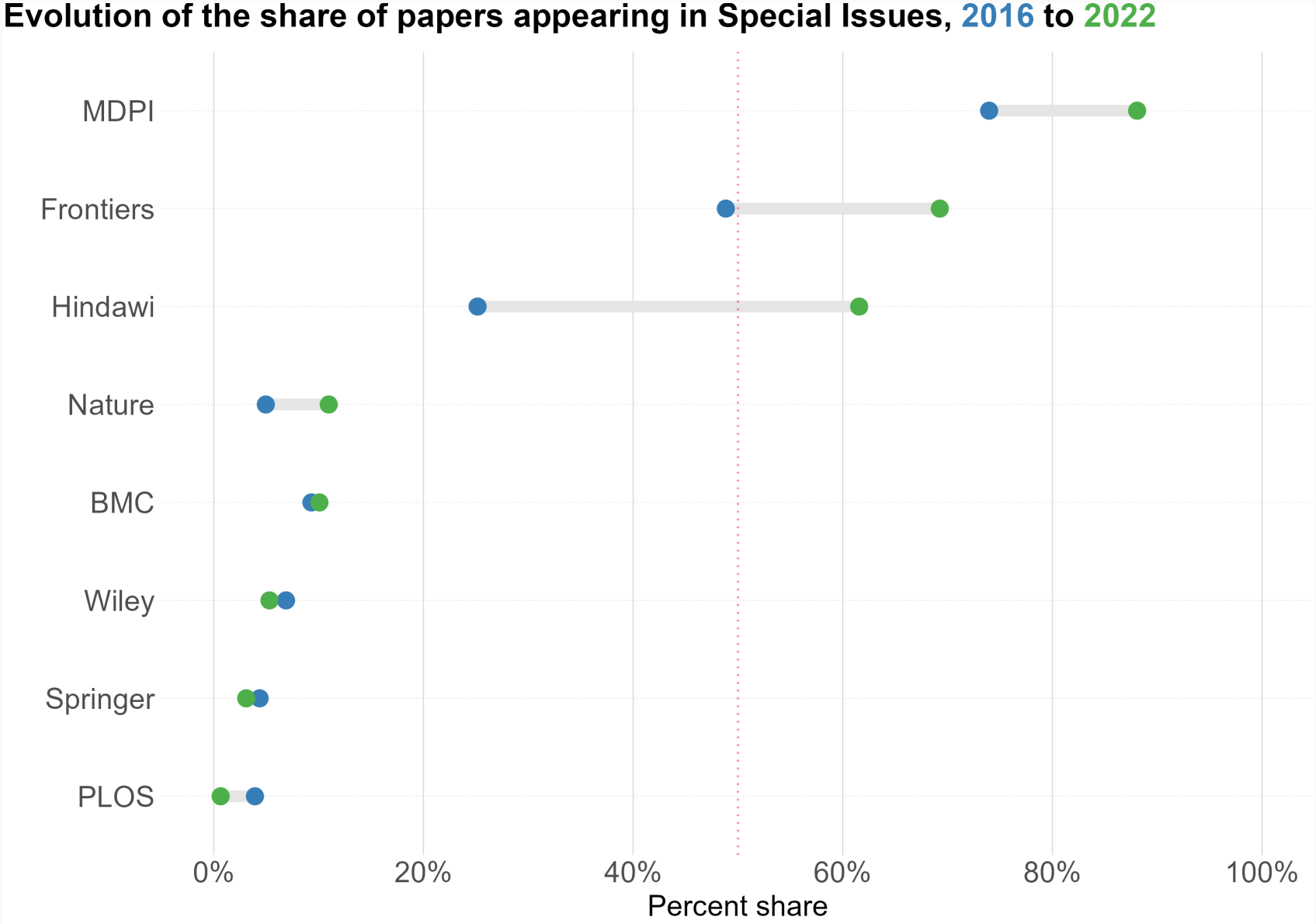
Journals at some OA publishers are mostly special issues



Source: data scraped from the publishers' website
Special issues are called Collections at PLOS and Topics at Frontiers. For MDPI Collections, Sections and Topics not shown.

What's going on?

Trends:

- SI as a fantastic engine of growth for big OA publishers

Why?

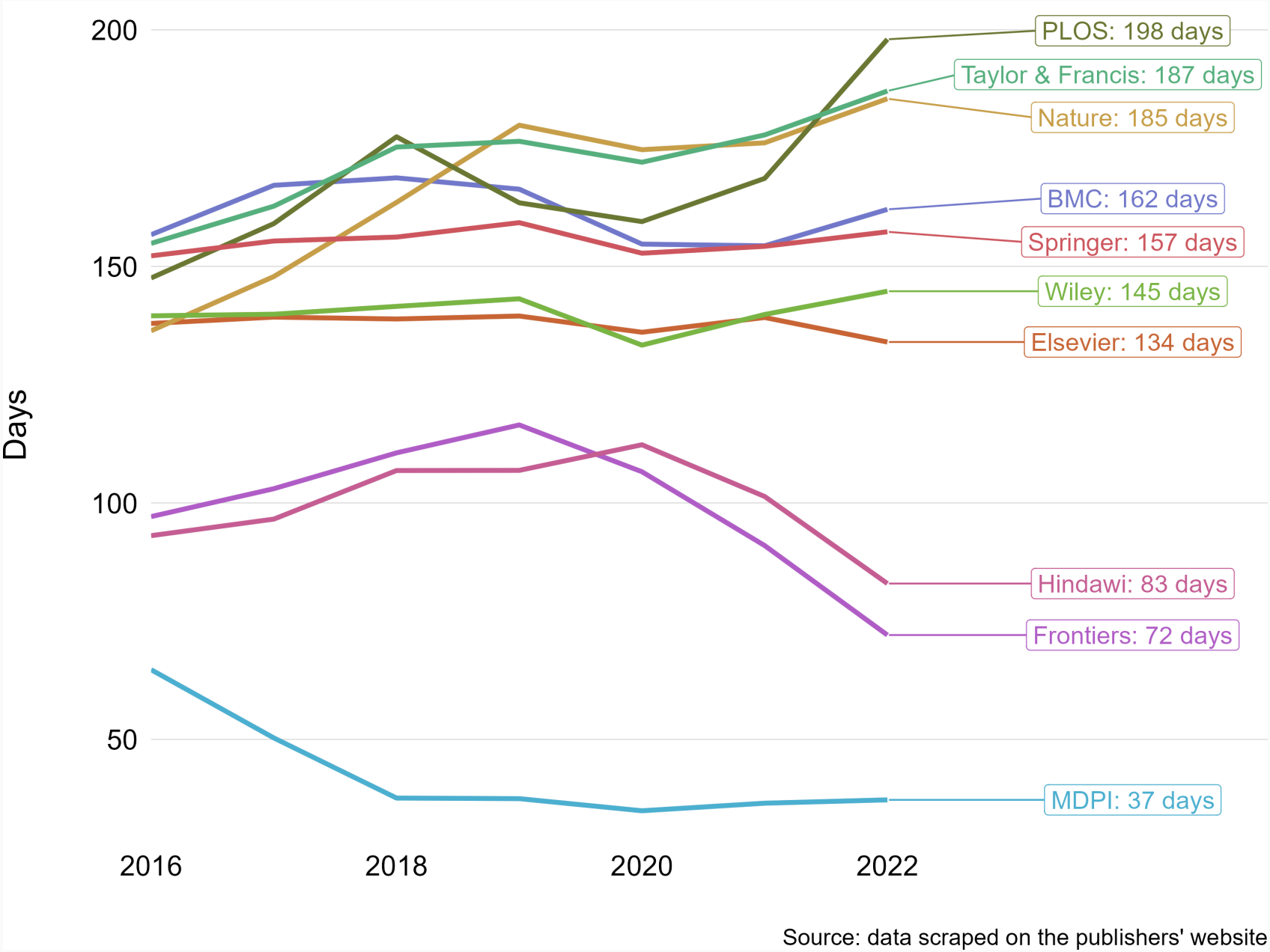
- Mobilization of an army of guest editors & their networks

Threats

- Less control increases chance of exploitation by authors
- Potential crisis of the SI model (Hindawi, IJERPH delisting)

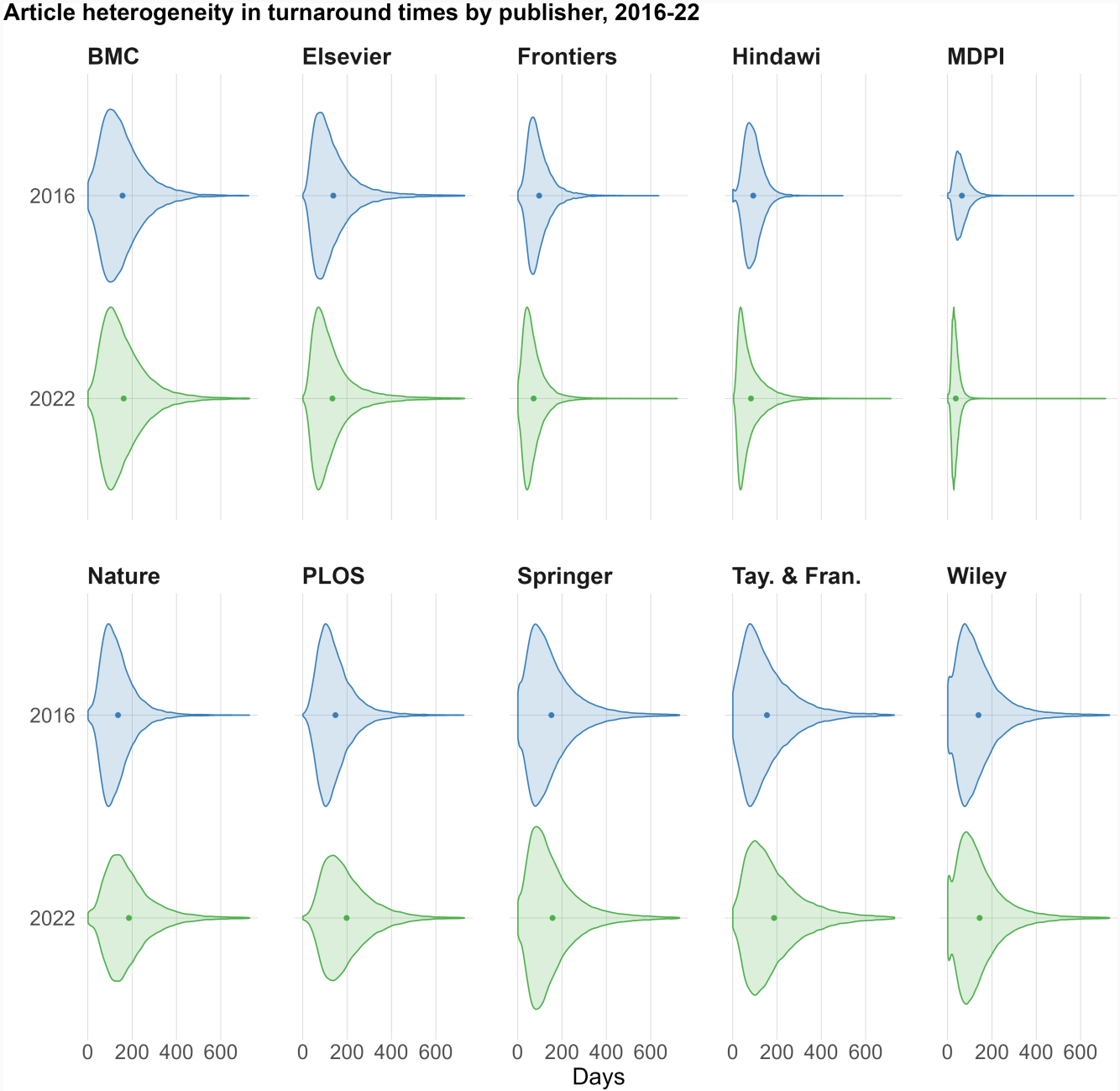
Turnaround times

Turnaround times have decreased for all for-profit OA publishers

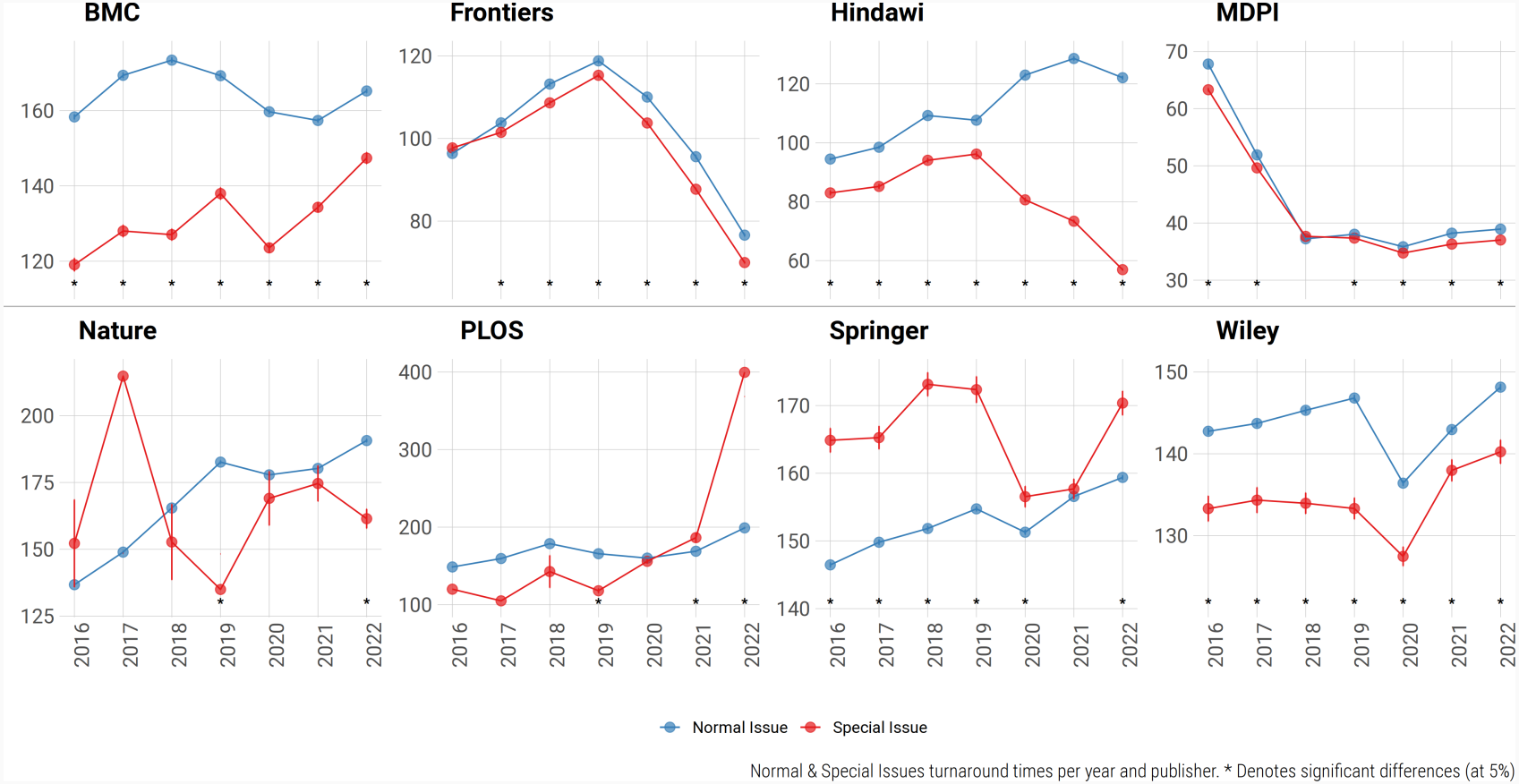


Source: data scraped on the publishers' website

Turnaround times are getting more homogeneous



Lower TATs for Special Issues



Normal & Special Issues turnaround times per year and publisher. * Denotes significant differences (at 5%)

What's going on?

Trends:

- TAT can be due to inefficiencies – good that they go down

Why?

- Convergence of authors & OA publishers incentives

Threats

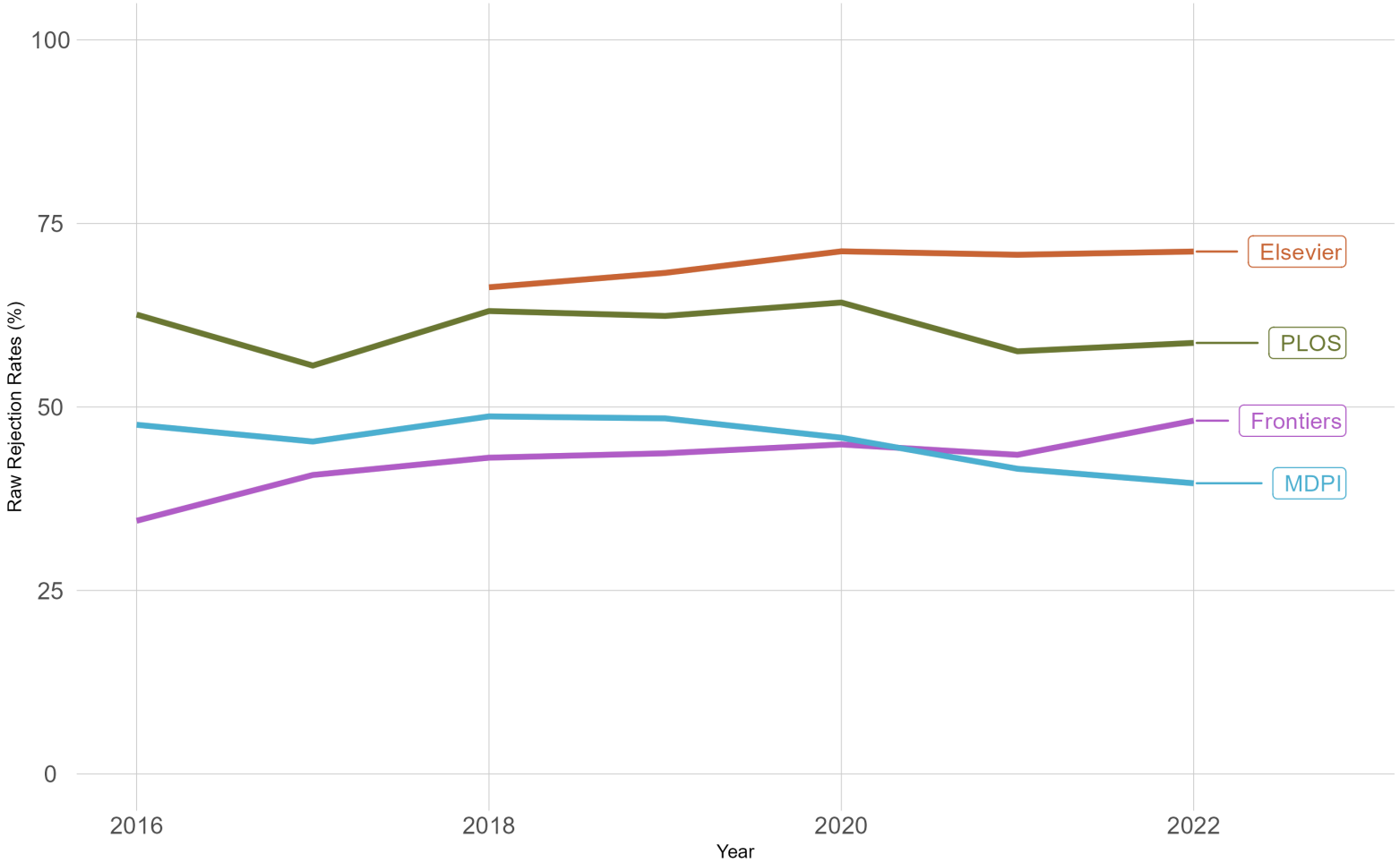
- Lower TAT must still allow for proper peer review
- Some TAT so low, it casts doubts on quality

Rejection rates

Rejection rates: absolute values

Evolution of raw rejection rates

Raw rejection rates calculated by publishers using own protocols (not standardised)

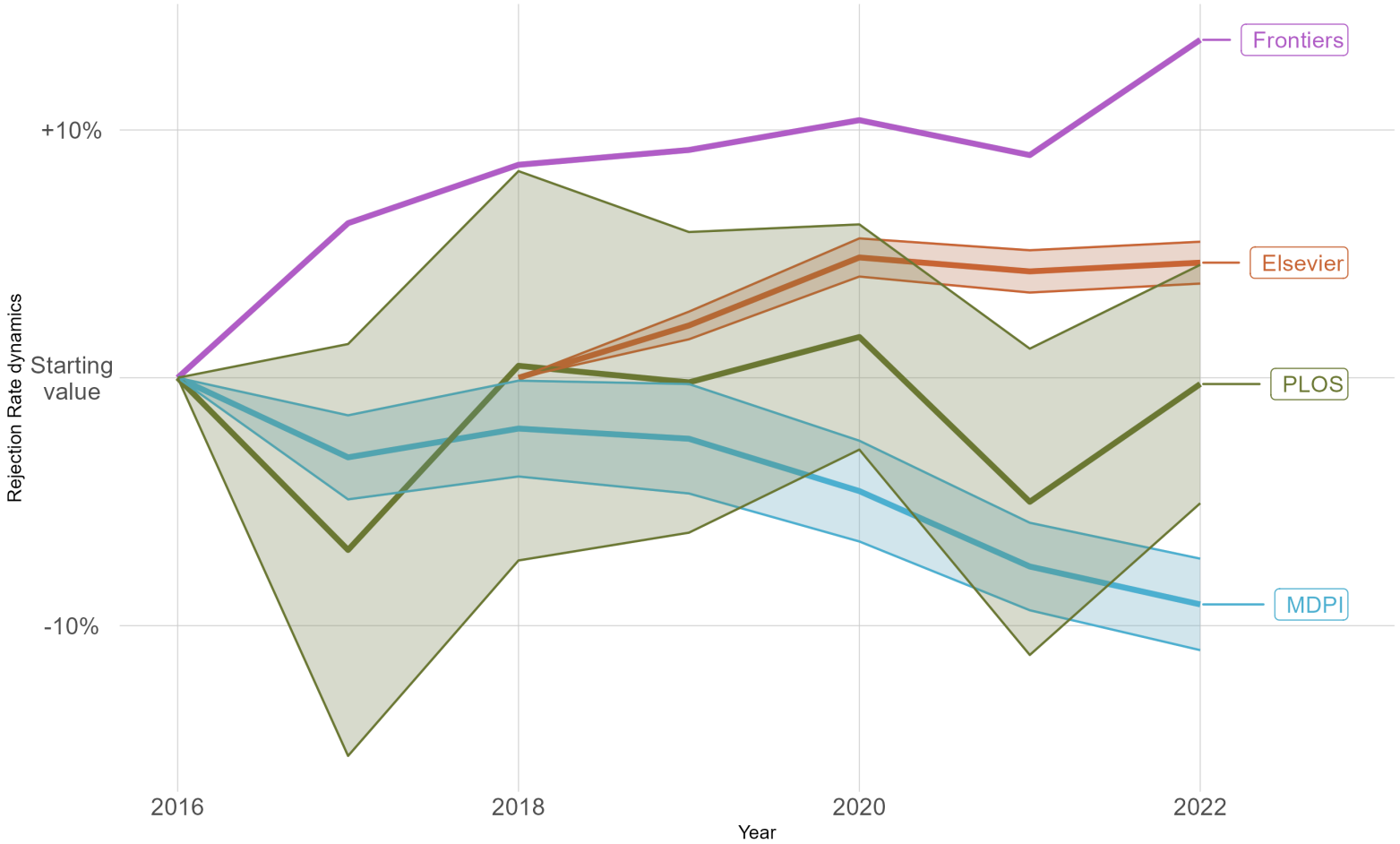


Source: web scraped data

Rejection rates: normalized

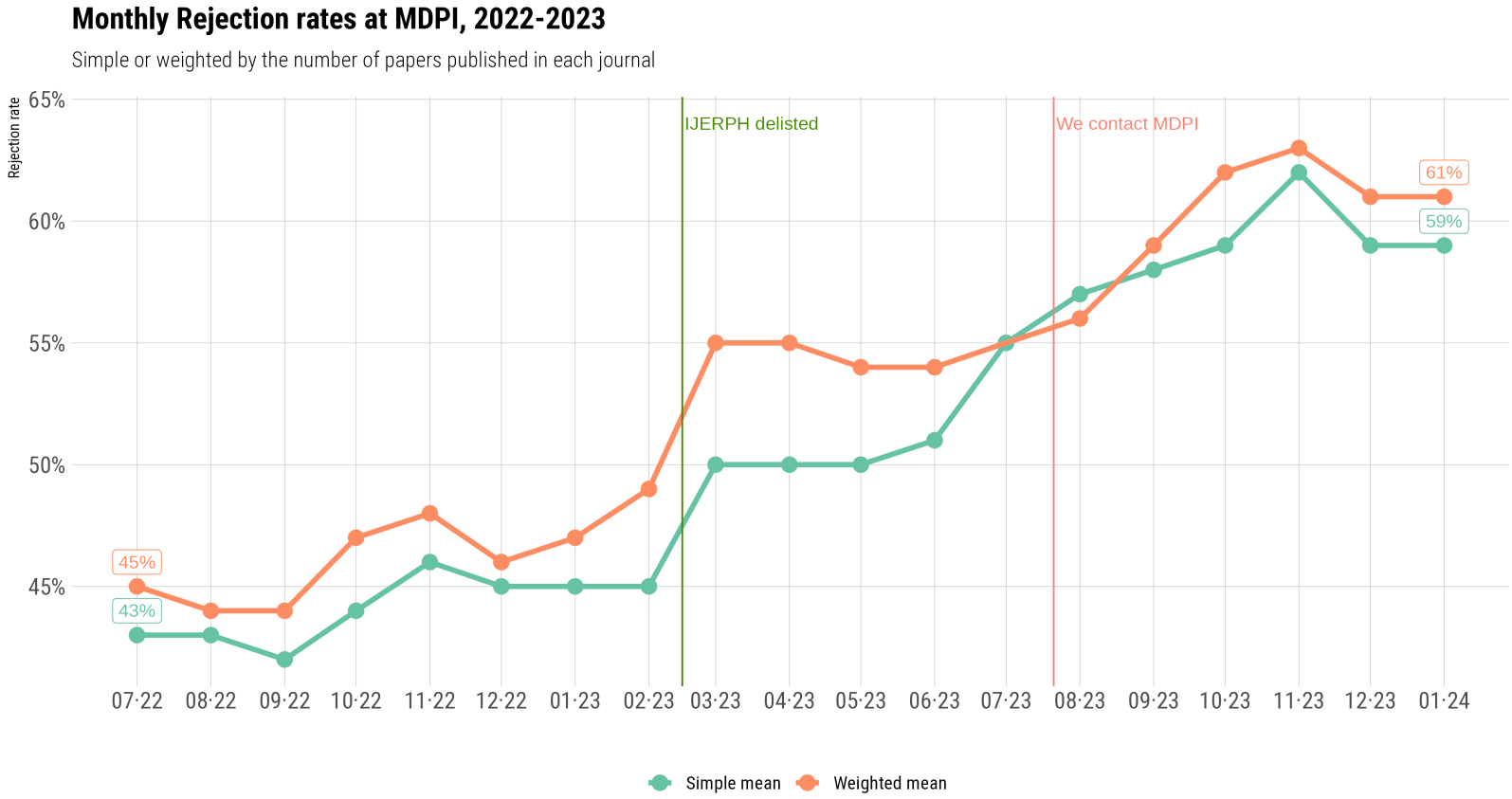
Evolution of normalised rejection rates

WIth respect to the first year in our dataset

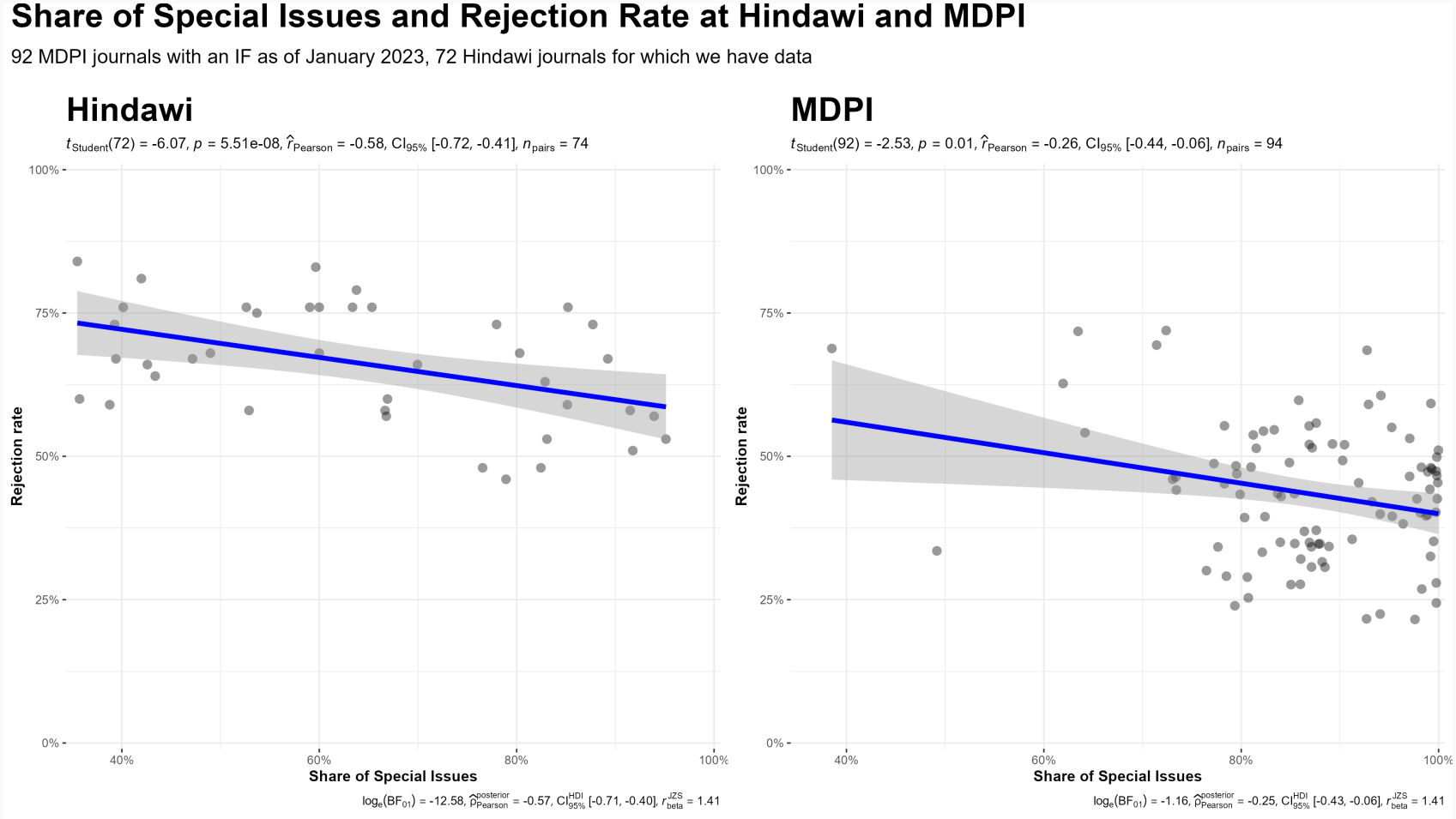


Shaded areas represent 95% CI, Frontiers has no CI as Frontiers data are aggregate over all journals from annual reports
Source: web scraped data

To be fair: RR at MDPI on the rise since 2023



More SIs, less rejections



What's going on?

Trends:

- Rejection rates are decreasing at some key publishers
- Increasing at others
- Very little data

Why?

- Convergence of authors & OA publishers incentives

Threats

- Lower rejection rates might mean lower quality
- Risk of instability of quality signals

Impact Factor inflation

Indicators of impact: Impact factor, Scimago Journal Rank

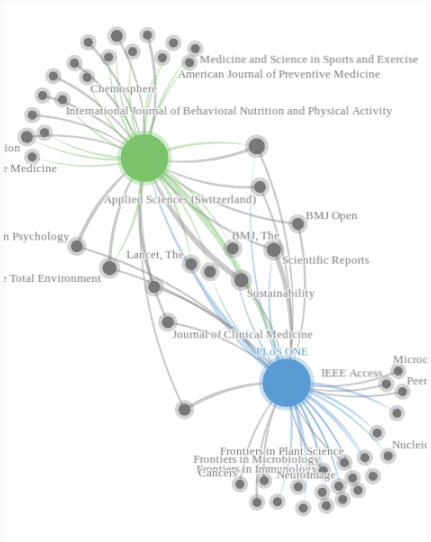
We measure Impact Factor Inflation as the ratio of IF to SJR

Impact Factor:

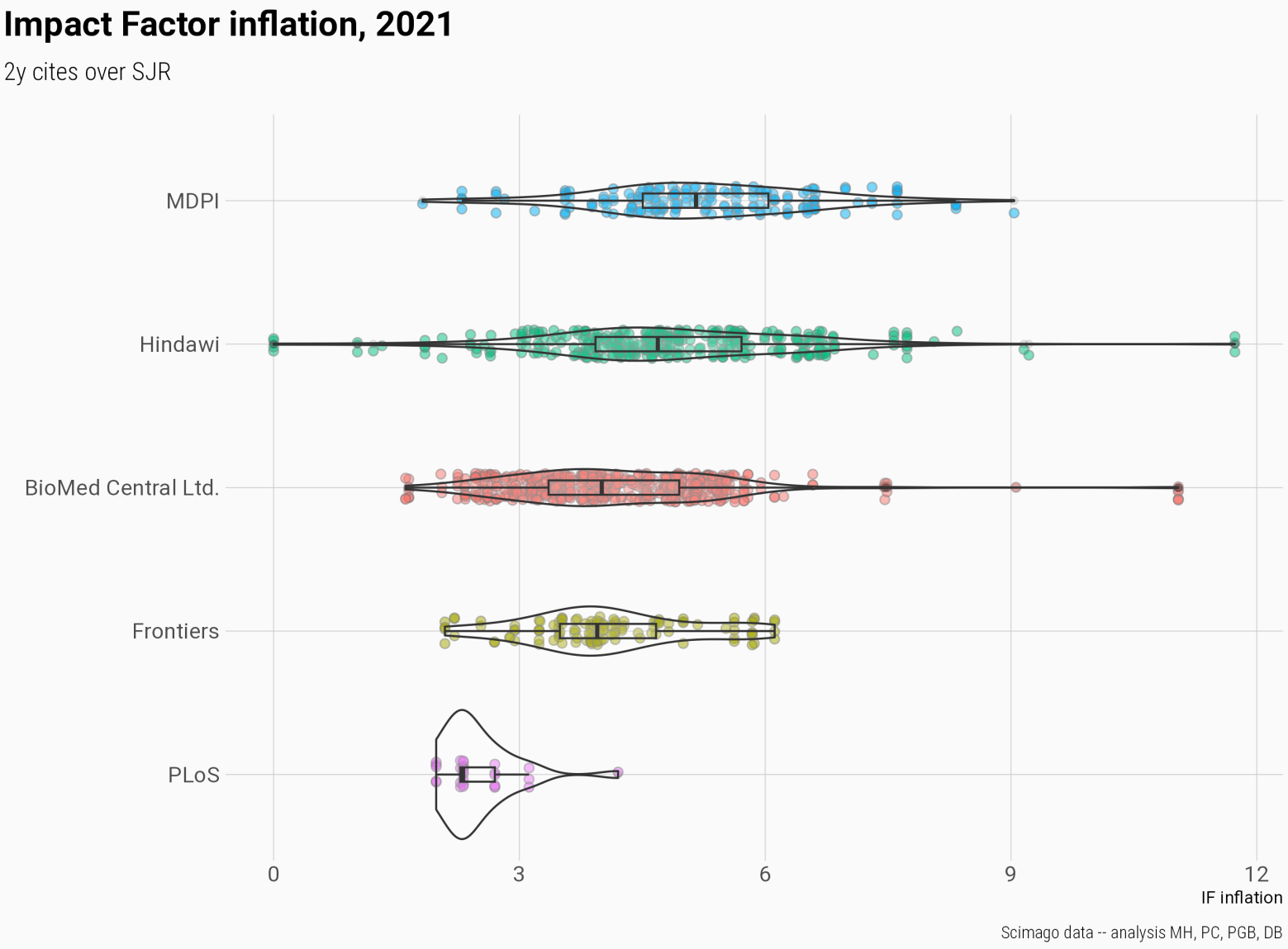
- cites/document at N years
- easily gamed

SJR: citation network counts

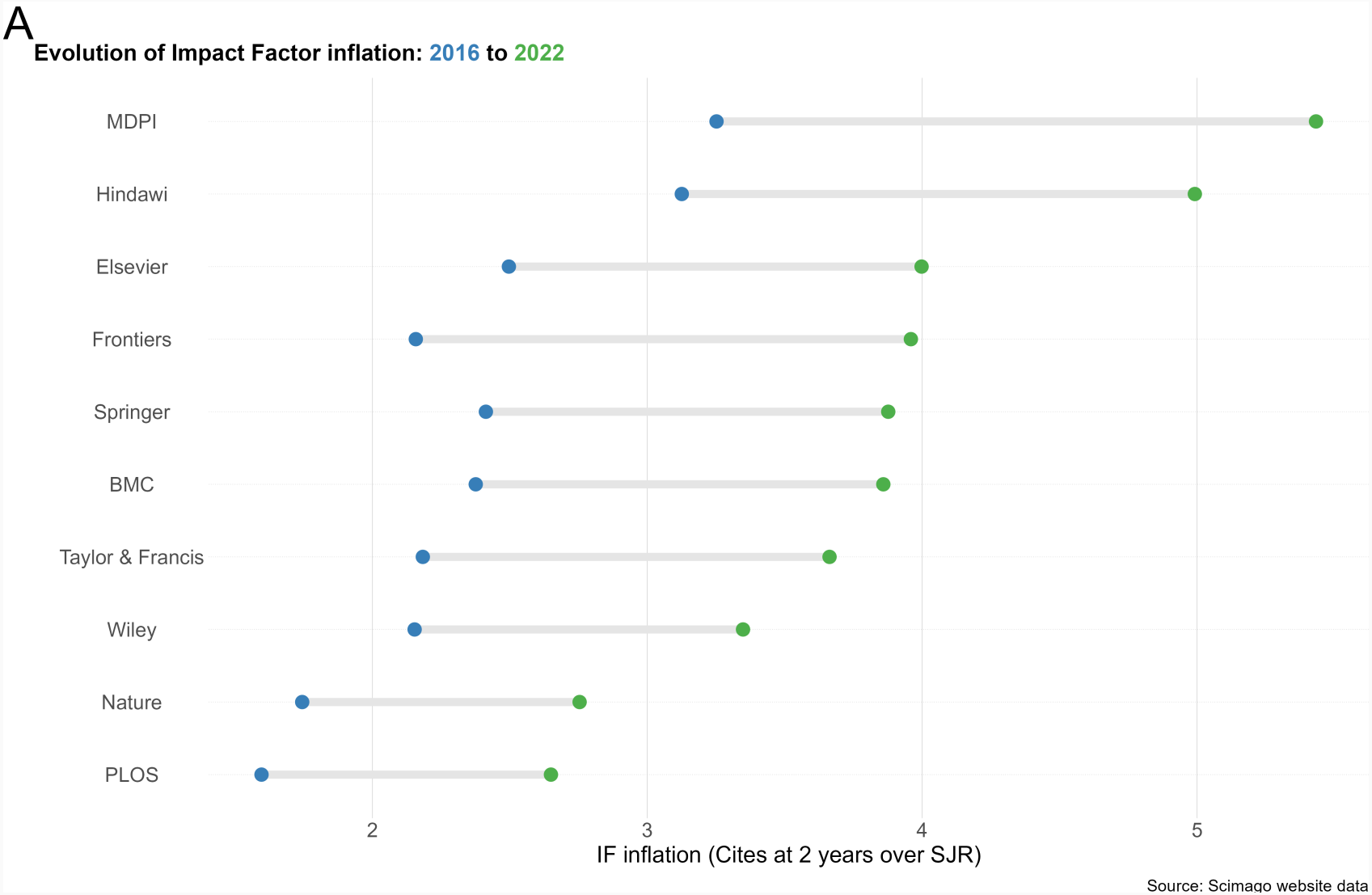
- Limits prestige from single source
- More prestige if cited by relevant journals
- Normalizes for field size
- Less easily gamed



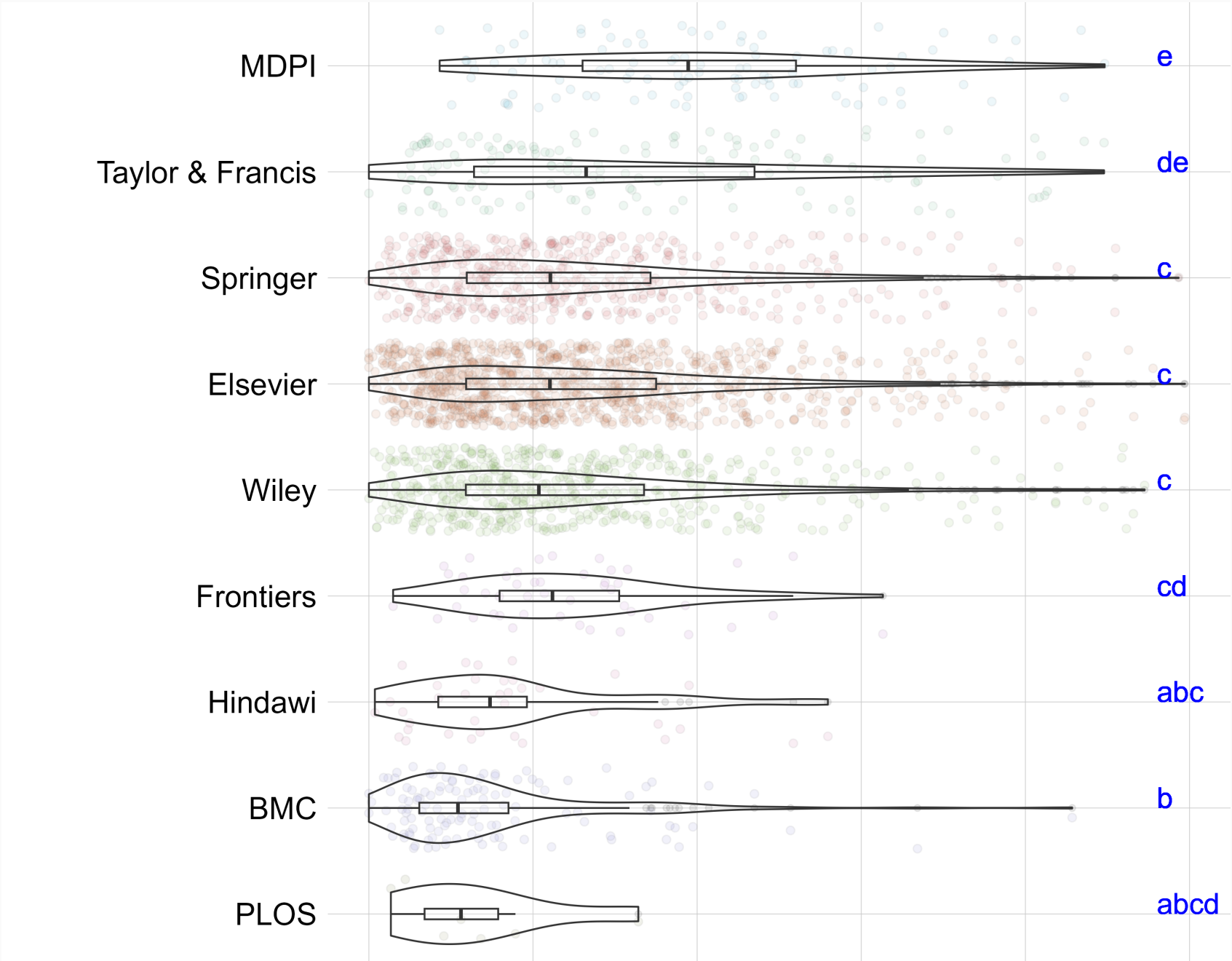
IF inflation 2021: some publishers



Evolution of IF inflation



IF inflation: why? Self-cites



What's going on?

Trends:

- IF is inflating – more so at some publishers

Why?

- Goodhart's law: *When a measure becomes a target, it ceases to be a good measure*

Threats

- Risk of instability of quality signals

At a glance

At a glance

Strain indicators at a glance: 2022 and evolution 2016-22

	2022					Change 2016-22				
	TOTAL ARTICLES	SHARE SPECIAL ISSUE	TURNAROUND TIME (DAYS)	REJECTION RATE	IMPACT INFLATION	TOTAL ARTICLES	SHARE SPECIAL ISSUE	TURNAROUND TIME (DAYS)	REJECTION RATE	IMPACT INFLATION
Overall	2816k	38%	116	62%	3.3	+47%	+27pp	-23	-1pp	+1.1
Elsevier	498k	--	134	71%	4.0	+41%	--	-4	+5pp*	+1.5
MDPI	264k	88%	37	40%	5.4	+1080%	+14pp	-28	-8pp	+2.2
Springer	250k	3%	157	--	3.9	+52%	-1pp	+5	--	+1.5
Wiley	231k	5%	145	--	3.3	+36%	-2pp	+5	--	+1.2
Frontiers	114k	69%	72	48%	4.0	+675%	+20pp	-25	+14pp	+1.8
Taylor & Francis	105k	--	--	--	3.7	+59%	--	--	--	+1.5
Nature	57k	11%	185	--	2.8	+32%	+6pp	+49	--	+1
BMC	44k	10%	162	--	3.9	+73%	+1pp	+5	--	+1.5
Hindawi	39k	62%	83	74%	5.0	+139%	+36pp	-10	+3pp°	+1.9
PLOS	19k	1%	198	59%	2.6	-23%	-3pp	+50	-4pp	+1.1

At a glance

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